

ADDENDUM NO. 1

To: All Bidders of Record

Date: June 16, 2015

RE: Clayton County Animal Control
3199 Anvil Block Road

This addendum forms a part of the contract documents dated May 22, 2015 and modifies the original project Manual and Drawings. All bidders shall acknowledge receipt of this addendum in their proposals to Hogan Construction. Failure to do so may subject bidders to disqualification.

A. MODIFICATIONS TO CONTRACTUAL/LEGAL REQUIREMENTS:

1. Bidder RFI's and Answers attached
2. Pre Bid Presentation Attached
3. Pre Bid Sign in Sheet Attached
4. Clayton County IT Department Owner Technology Specifications included
5. Surgery Light Cut sheet and installation instructions included
6. Resinous Floor Substitution Requests
7. Refer to Plans and Specifications:
 - i. The JR Smith Solid Trap interceptor will not be required for FD-2 (updated plumbing schedule sheet included)
 - ii. E-002
 - iii. E-201
 - iv. Specification 260543 included
 - v. Specification 283113 included

End of Addendum No. 1

Sincerely,



George Fragulis
Program Manager
Pond & Company



Pond & Company, Inc.

*Architects
Engineers
Planners*

3500 Parkway Lane
Suite 600
Norcross, GA 30092

P 678.336.7740
F 678.336.7744
www.pondco.com

BID PHASE SERVICES - RFIS

Project : Clayton County Animal Control
Pond Project No. : 1140234
Updated : June 16, 2015

NUMBER	QUESTION	ANSWER
1	Electrical One Line on E-002 indicates MDP to be 480/277V which appears to be an error since all distribution equipment is scheduled as 120/208, Please confirm?	The MDP shall be rated as 120/208V.
2	I see reference to Intrusion Detection Devices but nothing in the specs on the system; are we to include rough in only, boxes and conduits?	Electrical contractors shall provide the main fire alarm controller and panel that can accept intrusion detection inputs as well. See attached specification 283113 Fire Alarm Panels and Intrusion Detection from Honeywell. Intrusion detection system should be the rough in outside of the main Honeywell panel.
3	I see reference to Access Control Devices but nothing the specs on the system; are we to include rough in only, boxes and conduits	Provide rough in only for Access Control Devices
4	I see reference to CCTV but nothing in the specs on the system; are we to include rough in only, boxes and conduits	Provide rough in only CCTV Devices
5	I see symbols which appear to be for Tele/Data drops, however, the symbols legend on E-001, does not indicate specifically what these are, nor is there a spec section for communications. Are we to include rough in only, boxes and conduits	Provide rough in only for Tele/Data Drops. See attached Clayton County Animal Shelter Owner Technology Specifications document.
6	(1) Fixture in Restroom 117 does not have a designation attached, should it be Type F	Fixture in restroom 117 should be Type "F".
7	(1) Fixture in Restroom 118 does not have a designation attached, should it be Type F	Fixture in restroom 117 should be Type "F".
8	(2) Symbols (SL) in Surgical 129 per Keynote #2 indicate Surgical Lights. Keynote indicates to coordinate with plan I-102, however, there is no information concerning these surgical lights on that page, any other Interiors page or Architectural page. Are these fixtures to be supplied by the EC, and if so please provide specifications? If these fixtures are owner provided, EC installed, please provide any special mounting requirements as no information is found in the documents	See attached Surgery Light Installation instructions document.
9	Sheets E-101 nor E-401 indicate any access control system connection of the Sally Port Overhead doors, will there be any or will they only be controlled from switch on the inside of the Sally Port	Control of Sally Port Overhead doors will only be from switch on the inside of the Sally Port area.
10	Sheet E-101 indicates IT service entrance to be confirmed with County IT Department. Please advise what size and quantity of conduits need to be stubbed into IT room 120, and to what location on the exterior of the facility they need to extend	Provide (2) 4" Empty Conduits with pull string.



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11	General Note #2 on E-101 indicates to provide concrete encasement of exterior PVC conduits. Please confirm if this is intended for All exterior below grade conduits or just the Secondary service conduits from the Utility Transformer to the MDP	Secondary Service conduits from the Utility Transformer and Underground Ducts Crossing Driveways, Roadways, and Railroads shall be encased in reinforced concrete. See additional Specification 260543 – Underground Ducts and Raceways fro Electrical Systems
12	The roofing Specifications 075423 are specifying a 1/4" thick cover board in Section 2.6 C on page 3 but all the roof details on the drawing are referencing a 1/2" cover board. Please clarify which thickness is correct.	1/2" cover board is correct
13	In regards to the Floor Drain (FD-2), which is specified on Plumbing P601 fixture schedule, it is calling for a Zurn Z556Y floor drain with a JR Smith 8750T Solid hair interceptor trap. The JR Smith 8750 solid interceptor trap is engineered and design for in-line sin drainage and use.	The JR Smith 8750 will not be required for floor drains. The integral sediment bucket will be sufficient.
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Hogan

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PRE-BID CONFERENCE

Clayton County Animal Control New Animal Control

Bid documents are available now.

Pre-bid Location:

Clayton County VIP Complex
2300 Highway 138 SE
Jonesboro, GA 30236

Pre-Bid Date:

Friday, June 12, 2015
10:00 a.m.

Site Location:

Anvil Block Road
Ellenwood, GA 30294

Proposal Due:

Friday, June 26, 2015
Noon



AREA
40.70 ACRES
1,773,109 Sq. Ft.

ANIMAL CONTROL BUILDING
FF = 926

SECTOR 2 POLICE PRECINCT RETENTION POND
 (DESIGN BY OTHERS)

NEW FENCE TO CONNECT TO EXISTING FENCE.

NEW FENCE TO CONNECT TO EXISTING FENCE.

TOP OF BANK

50' STREAM BUFFER

75' IMPERVIOUS SURFACE SETBACK

PROPOSED POND ENLARGEMENT

GRAVEL DRIVE; 6" DEPTH
GDOT NO. 57 STONE W/
FILTER FABRIC AND 6"x6"
PT TIMBER BORDER

DUMPSTER PAD

TRANSFORMER PAD
 -SEE ELECTRICAL PLANS FOR DETAIL

6'-0" HIGH PVC-COATED CHAIN
LINK HEAVY DUTY FENCE (TYP)
 -SEE DETAIL

6' CONCRETE
BOLLARDS (TYP.)
 -SEE DETAIL

DETECTION
LOOP
 -SEE NOTE 23

TAPER CURB 6"
TO 0" IN -3 FT

12' WIDE DOUBLE LEAF
CHAINLINK SWING GATE
 -SEE DETAIL

24" WIDE OPENING,
CONCRETE PAVED CURB CUT
TO ACCOMMODATE GATE
OPENING

STANDARD PARKING STALL
(9'x18' TYP.)

CURB & GUTTER
 -SEE DETAIL

ADA VAN
ACCESSIBLE
PARKING

ADA ACCESSIBLE
PARKING AND RAMP
 -SEE DETAIL

ELECTRONIC GATE ACCESS OPERATOR
 INSTALLED PER VENDER SPECIFICATIONS.
 OPERATOR PANEL TO INCLUDE KNOX KEY
 SWITCH OR EQUIVALENT.
 SEE ELECTRICAL PLANS FOR SPECIFICATIONS.
 SEE NOTE 23.

6' CONCRETE
SIDEWALK

CONCRETE WHEEL
STOP (TYP)

CONTROL/EXPANSION
JOINT (TYP.)
 -SEE NOTE 17

6' WIDE SINGLE LEAF
CHAINLINK SWING GATE
 -SEE DETAIL

CONCRETE PAD (TYP.)
 -SEE DETAIL

APPROX LLL

N:1320844.31
E:2260128.72

SIDEWALK AND LANDSCAPING
BEYOND THIS POINT TO BE
COMPLETED BY OTHER

GDOT TYPE 2 CONCRETE
CURB & GUTTER -SEE
DETAIL

GDOT MODIFIED TYPE C RAMP
WITH DETECTABLE WARNINGS (TYP)
 -SEE DETAIL

MONUMENT SIGN TO BE PROVIDED
BY CONTRACTOR AT THE DIRECTION
OF OWNER

STRIPED CROSSWALK PER
GDOT STANDARDS

2' WIDE WHITE STOP BAR

30'-5" WIDE DOUBLE
YELLOW STRIPE

GDOT MODIFIED TYPE B RAMP
WITH DETECTABLE WARNINGS (TYP)
 -SEE DETAIL

SIDEWALK AND LANDSCAPING
BEYOND THIS POINT TO BE
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FUTURE
DEVELOPMENT

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CONCRETE WHEEL
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CONTROL/EXPANSION
JOINT (TYP.)
 -SEE NOTE 17

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CURB & GUTTER -SEE
DETAIL

GDOT MOD



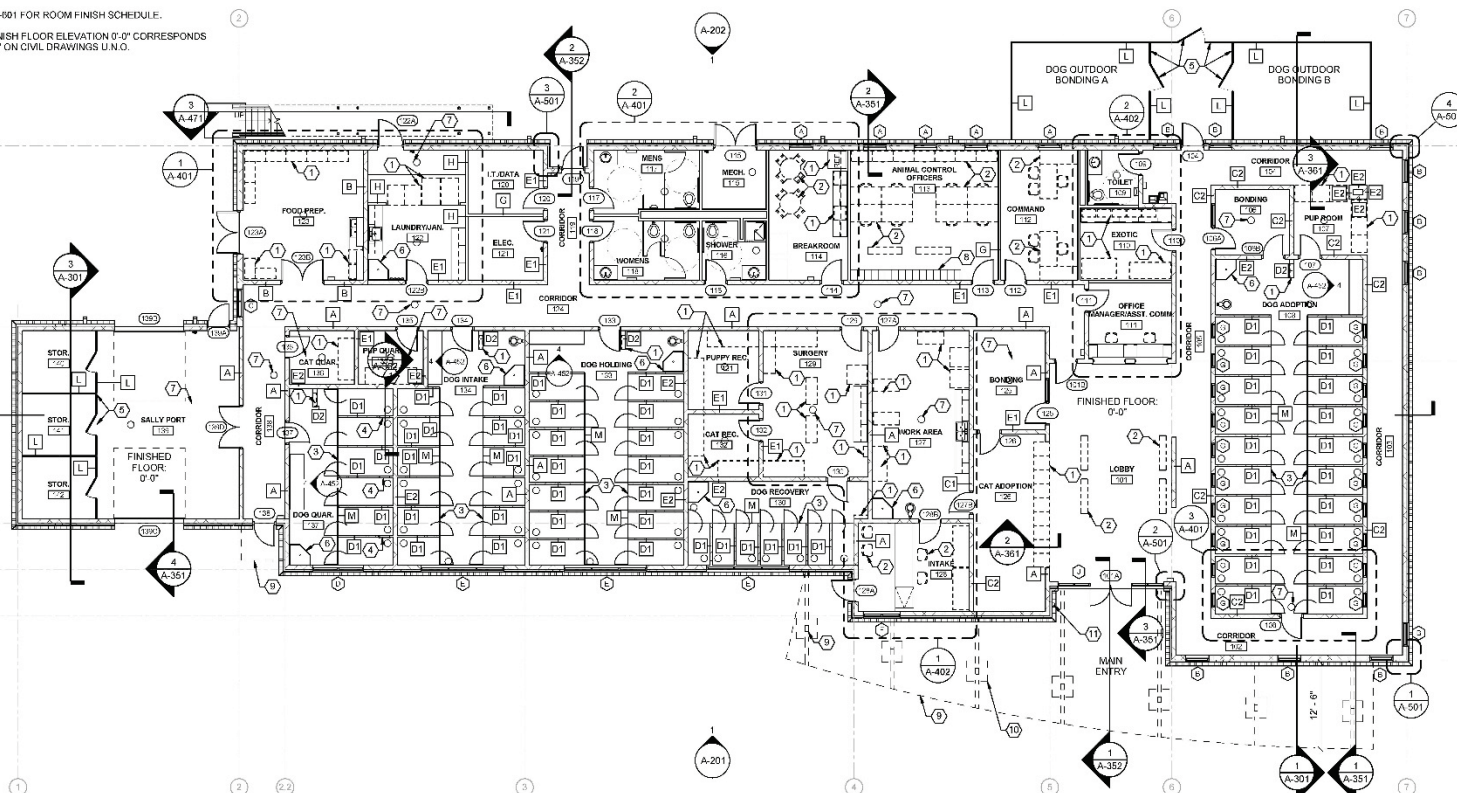
FLOOR PLAN

GENERAL NOTES - NOTED PLAN

1. SEE SHEET A-001 FOR GENERAL NOTES.
2. SEE STRUCTURAL, MECHANICAL, PLUMBING, & ELECTRICAL DRAWINGS FOR ADDITIONAL INFORMATION.
3. DIMENSIONS OF EXTERIOR WALLS ARE TO FACE OF BRICK AND FACE OF CMU. INTERIOR WALLS ARE TO FACE OF METAL STUD, FACE OF CMU, AND FINISH FACE OF GWB.
4. ALL PARTITIONS ARE TYPE "A" U.N.O.
5. PARTITION TYPE INDICATED WITH . SEE SHEET A-371 FOR PARTITION TYPES.
6. DOORS INDICATED WITH . SEE SHEET A-601 FOR DOOR SCHEDULE & TYPES.
7. WINDOWS INDICATED WITH . SEE SHEET A-651 FOR WINDOW TYPES.
8. KEYNOTES INDICATED WITH .
9. SEE SHEET A-571 FOR ADA MOUNTING HEIGHTS.
10. SEE SHEET I-101 FOR FURNITURE & EQUIPMENT LAYOUT & SCHEDULES.
11. SEE SHEET I-001 FOR ROOM FINISH SCHEDULE.
12. BUILDING FINISH FLOOR ELEVATION 0'-0" CORRESPONDS TO ELEV. 926' ON CIVIL DRAWINGS U.N.O.

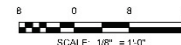
KEY NOTES - NOTED FLOOR PLAN

NOTE #	DESCRIPTION
1	EQUIPMENT - SEE I-101 FOR SCHEDULE
2	FURNITURE - SEE I-101 FOR SCHEDULE
3	WIRE MESH FENCE W/ GATE
4	GUILLOTINE DOOR
5	VINYL GLAD CHAIN-LINK FENCE W/ 3'-0" GATE
6	MOP SINK
7	FLOOR DRAIN OR CLEANOUT TYP. - SEE PLUMBING
8	(16) 12"W X 18"D FULL HEIGHT METAL LOCKERS
9	ALUMINUM CANOPY SYSTEM
10	CONCRETE FOOTING - REFER TO ALUMINUM CANOPY MANUFACTURER SHOP DRAWINGS FOR SIZE & REINFORCEMENT
11	KNOX BOX



FLOOR PLAN - NOTED

SCALE: 1/8" = 1'-0"



SCALE: 1/8" = 1'-0"

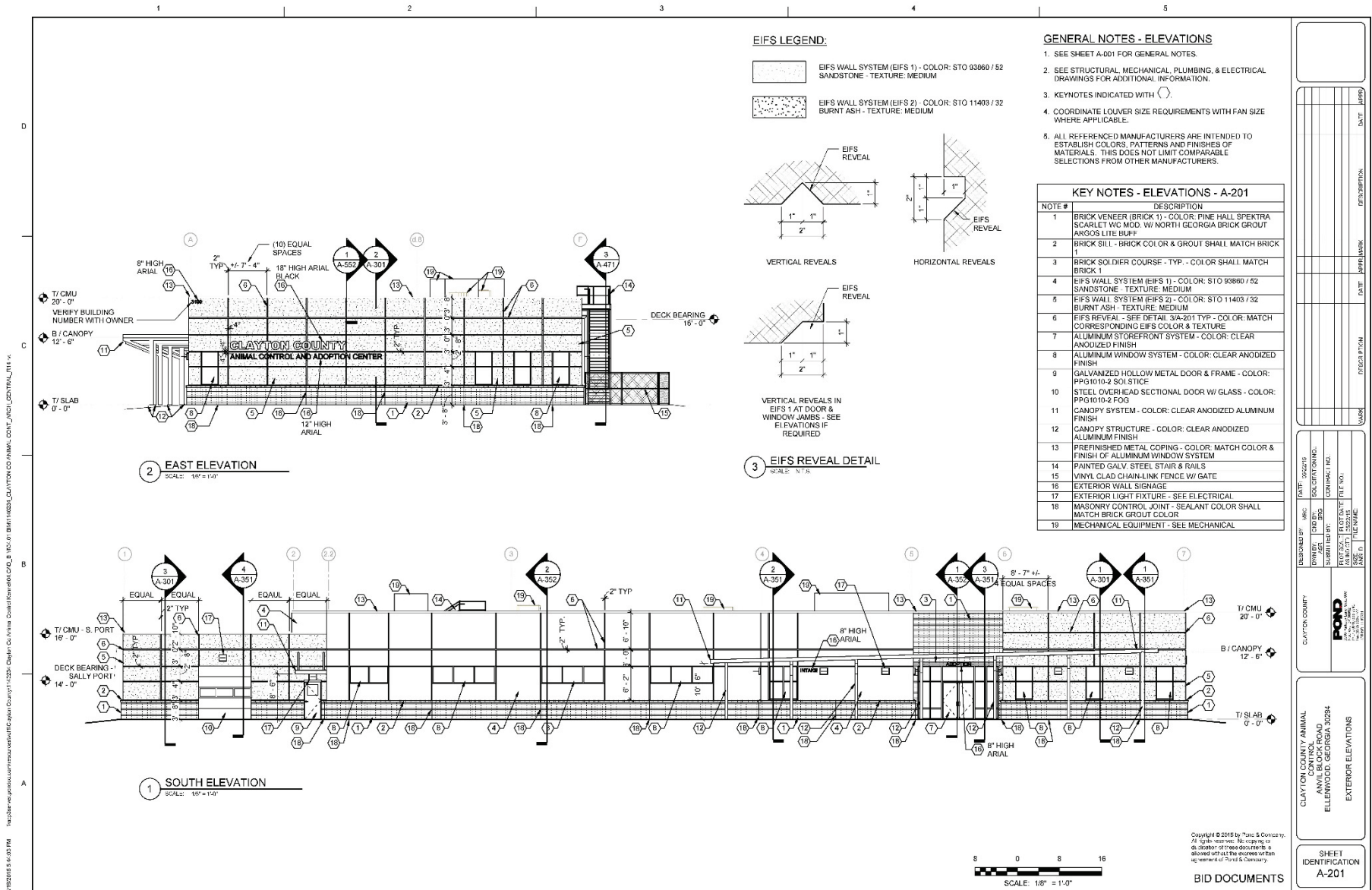
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BID DOCUMENTS

DATE: 10/15/2015	DATE: 10/15/2015
DESIGNED BY: MEC	DATE: 10/15/2015
DRAWN BY: MEC	DATE: 10/15/2015
CHECKED BY: MEC	DATE: 10/15/2015
APPROVED BY: MEC	DATE: 10/15/2015
OWNER: CLAYTON COUNTY	DATE: 10/15/2015
PROJECT NO.: 15-0000000000	DATE: 10/15/2015
PROJECT NAME: CLAYTON COUNTY ANIMAL CONTROL AND ADOPTION CENTER	DATE: 10/15/2015
PROJECT LOCATION: ELLENWOOD, GEORGIA 30294	DATE: 10/15/2015
PROJECT DESCRIPTION: FLOOR PLAN - NOTED	DATE: 10/15/2015
SHEET IDENTIFICATION: A-101	DATE: 10/15/2015



ELEVATION





BID DOCUMENTS

Construction Documents for this project are available for review and procurement from the sites listed below.

- LDI
- DIS/Action Blue
- Hogan Construction
- iSqFt
- ACG – Associated General Contractors of Georgia, Inc.
- McGraw-Hill/Dodge
- Reed Construction Data
- Blue Book



BID SUBMISSION

- A. **BID SUBMISSION DATE & TIME:** All Subcontractor Bid Submissions are due on Friday, June 26, 2015 at Noon.
- B. All Bids must be submitted on Company Letterhead.
- C. **BID SUBMISSION LOCATION:** All Subcontractor Bid Submissions must be sent directly to Hogan Construction Group using one of the following methods:
 - EMAIL: ASMann@hoganconstructiongroup.com
 - FAX: 770.242.3100, Attn: Amy Sue Mann
 - MAIL/DELIVERY: Hogan Construction Group, LLC
5075 Avalon Ridge Parkway
Norcross, GA 30071
- D. **Packaging –** All mailed/delivered subcontractor bids must be in a sealed envelope, labeled as follows:
 - 1. Name of Project (Clayton County Animal Control)
 - 2. Name of Contractor
 - 3. Bid Package
 - 4. Date of Delivery
- E. **Receipt –** All bids must be received by the predetermined time on the predetermined date.



BID SCHEDULE

- **5.28.15** – Bid and Construction Documents are available.
- **6.12.15** at 10:00 A.M. – Subcontractor Pre-Bid Conference.
- **6.18.15** at Noon – Bidder questions are due.
- **6.23.15** – Final Addendum, if required, to be posted.
- **6.26.15** at Noon – All Subcontractor bids are due.
- **8.18.15** – Work intended to commence.
- The schedule for Sitework will commence immediately after issuance of the Notice to Proceed and receipt of all applicable Permits.
- Overall duration of construction activities is anticipated to be 7 months.



GENERAL ITEMS

- **Insurance** – All responding subcontractors must be able to meet or exceed the requirements listed below:
 - ✓ General Liability: \$1,000,000 (Each Occurrence); \$2,000,000 (Aggregate)
 - ✓ \$1,000,000 (Products/Completed Operations Aggregate)
 - ✓ Excess/Umbrella Liability: \$1,000,000 (Each Occurrence & Aggregate)
 - ✓ Worker's Compensation: \$100,000 (Each Accident & Disease Each Employee);
 - ✓ \$500,000 (Disease Policy Limit)
 - ✓ Automobile Liability: \$1,000,000
- **Hogan Construction Group Subcontractor Prequalification**
- **E-Verify**
- **Payment and Performance Bonds**
- **Subcontractor Agreement**
- **Clayton County SLBE Program**



CLAYTON COUNTY SLBE PROGRAM

- **Two Types of Certification:**
 - **Locally based inside of Clayton County**
 - **Locally based outside of Clayton County but in DeKalb, Fayette, Fulton, Henry, or Spaulding County (5 surrounding counties)**
- **Located and Operated for a Minimum of One (1) Year with a Valid Business License**
- **Certification Documents Available on Clayton County Central Services Website**
(<http://www.claytoncountyga.gov/departments/central-services.aspx>)
- **Project Goal – 30%**



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- QUESTIONS

Please contact Amy Sue Mann for any questions. She can be reached at:

770.242.8588

and

ASMann@HoganConstructionGroup.com

PRE-BID CONFERENCE FOR SUB CONTRACTORS FOR
CLAYTON COUNTY ANIMAL KENNEL
FRIDAY, JUNE 12, 2015 10:00 AM
CLAYTON COUNTY INTERNATIONAL PARK
VIP COMPLEX

Sign-in Sheet

"Print Information to Ensure Legibility"

Contact Name Michael Collier
Company Blackhawk Const. Service, LLC
Address 950 Eagles Landing Parkway Stockbridge, GA
Phone 770-294-8999
Fax 770-477-1721
E-Mail mcollier@blackhawkga.com

"Print Information to Ensure Legibility"

Contact Name GEORGE FRANKS
Company POND
Address 3500 PARKWAY LN STE 600
Phone 678-336-7740
Fax
E-Mail gregulsg@pondco.com

"Print Information to Ensure Legibility"

Contact Name Amy Sue Mann
Company Hogan Construction Group
Address 5075 Avalon Ridge Parkway Norcross 30071
Phone 770-242-8588
Fax
E-Mail asmann@hoganconstructiongroup.com

"Print Information to Ensure Legibility"

Contact Name DAVID DILLARD
Company Lewis Contracting Services
Address 547 FLOT SHOTS -
Phone 4-522-1538
Fax 770-482-5096
E-Mail DDillard@LewisContractingServices.com

"Print Information to Ensure Legibility"

Contact Name Melissa McIntyre
Company McIntyre Fencing
Address 2047 Locust Grove Rd Griffin Ga
Phone 770-227-2009
Fax 770-412-0777
E-Mail melissa@mcintyrefencing.com

"Print Information to Ensure Legibility"

Contact Name AMERICAN SPECIALTY - SANDY SHULMAN
Company
Address 4880 LOWER ROSWELL RD., SUITE 165-411, MARIETTA, GA
Phone 404.281.5322
Fax 843.664.4362
E-Mail SANDYSHULMAN@AMERICAN SPECIALTY.BIZ

"Print Information to Ensure Legibility"

Contact Name SEAN R KOONCE
Company Big "K" Cleaning
Address 289 Jonesboro Rd
Phone (6) 778-7596
Fax
E-Mail

"Print Information to Ensure Legibility"

Contact Name Pat Murphy
Company TherMeC
Address 6075 Atlantic Blvd. Norcross, GA 30071
Phone 770-242-9605
Fax 770-242-0139
E-Mail PMurphy@therMeC.com

"Print Information to Ensure Legibility"

Contact Name NICK PRATER
Company Mc's PAINTING
Address 7663 NEBO RD HIRAM GA 30141
Phone 770 352 4566
Fax 770 439 0724
E-Mail NICK@MCS PAINT.COM

"Print Information to Ensure Legibility"

Contact Name Hand M Construction Demo Crew
Company Monica Williams
Address 7001 Talkeeta Ct SW Atlanta, GA 30331
Phone 678 769-0442
Fax _____
E-Mail aandmconstructiondemo crew@yahoo.com

"Print Information to Ensure Legibility"

Contact Name Eureka Bathe
Company Hand M Construction
Address 7001 Talkeeta Ct. SW Atlanta, GA 30331
Phone 678-769-0442
Fax _____
E-Mail Hand M constructiondemo crew@yahoo.com

"Print Information to Ensure Legibility"

Contact Name Rick Jones
Company Rick's Cleaning Service, LLC
Address 110 Walker Way #856
Phone 478-461-4674
Fax _____
E-Mail rick3120@yahoo.com

"Print Information to Ensure Legibility"

Contact Name Deborah Harmon / James Hairston
Company Integrity Janitorial Cleaning Service
Address _____
Phone Cell 678-755-1911 / Office 404 530-0812
Fax _____
E-Mail integrityclean@bellsouth.com

"Print Information to Ensure Legibility"

Contact Name Marques Robie
Company Georgia Construction Specialists
Address 238 Stockbridge Rd Jonesboro
Phone (404) 217-9513
Fax _____
E-Mail georgiaconstructionspecialists@gmail.com

"Print Information to Ensure Legibility"

Contact Name ANTHONY BURKS
Company COMMERCIAL PAINTERS 360
Address 4482 Baylen Dr
Phone 404-860-8535
Fax 678-838-7777
E-Mail commercialpainters360@gmail.com

"Print Information to Ensure Legibility"

Contact Name Patricia Speer Inc.
Company Ken Carter
Address 2505 Veterans Memorial Hwy
Phone 678-576-5210
Fax _____
E-Mail KeneyCarter3@yahoo.com

"Print Information to Ensure Legibility"

Contact Name Chris Haynie
Company Georgia Construction Specialists
Address _____
Phone 404-317-1286
Fax _____
E-Mail chrishaynie@ymail.com

"Print Information to Ensure Legibility"

Contact Name Todd Williams
Company GA Fire Protection Consultants
Address Buchanan GA
Phone 404-955-5376
Fax _____
E-Mail TWilliams@GFPCLLC.com

"Print Information to Ensure Legibility"

Contact Name Interior Const Group
Company ICG
Address 2505 Vet Memorial Hwy
Phone 678-794-9643
Fax 770-635-7009
E-Mail Iconstgllc@gmail.com

"Print Information to Ensure Legibility"

Contact Name POW PORTMANN
Company LASHLEY TRACTOR SALES
Address 6953 COVINGTON HWY Lithonia GA
Phone 770-349-3031
Fax 678-618-1375
E-Mail portmann@lashleyts.com

"Print Information to Ensure Legibility"

Contact Name BRIAN MILLER
Company B+J Plumbing
Address 6146 Amberly Rd Rex GA
Phone 770 912 3085
Fax _____
E-Mail bandj365@gmail.com

"Print Information to Ensure Legibility"

Contact Name TIM BROADY
Company ACSENTIAL CONSTRUCTION
Address _____
Phone 678-463-6038
Fax _____
E-Mail LBROADY@ACSENTIAL.COM

"Print Information to Ensure Legibility"

Contact Name LEROY MCGARITY
Company LM Ventures Corp
Address 285 Centennial Olympic Pk Dr 705
Phone 404-593-6302
Fax _____
E-Mail lcmgarity@gmail.com

"Print Information to Ensure Legibility"

Contact Name DEE McLEROY
Company McLEROY, ~~THE~~ INC
Address 8945 US HWY 17 ZEBOLON GA 30245
Phone 770 567 4400
Fax 770 567 3300
E-Mail dee@mcleeroyinc.com

Clayton County
Technology Infrastructure
Clayton County Animal Control Kennel
Anvil Block Rd.
Ellenwood, Ga 30294

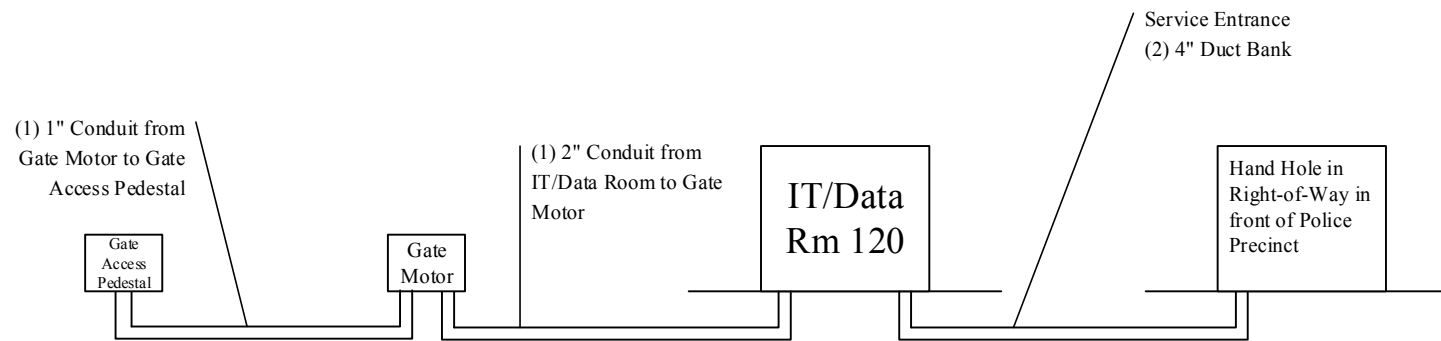
Drawing Index

T-CCL Communications Conduit Logical

T-ER1 Main Equipment Room Plan

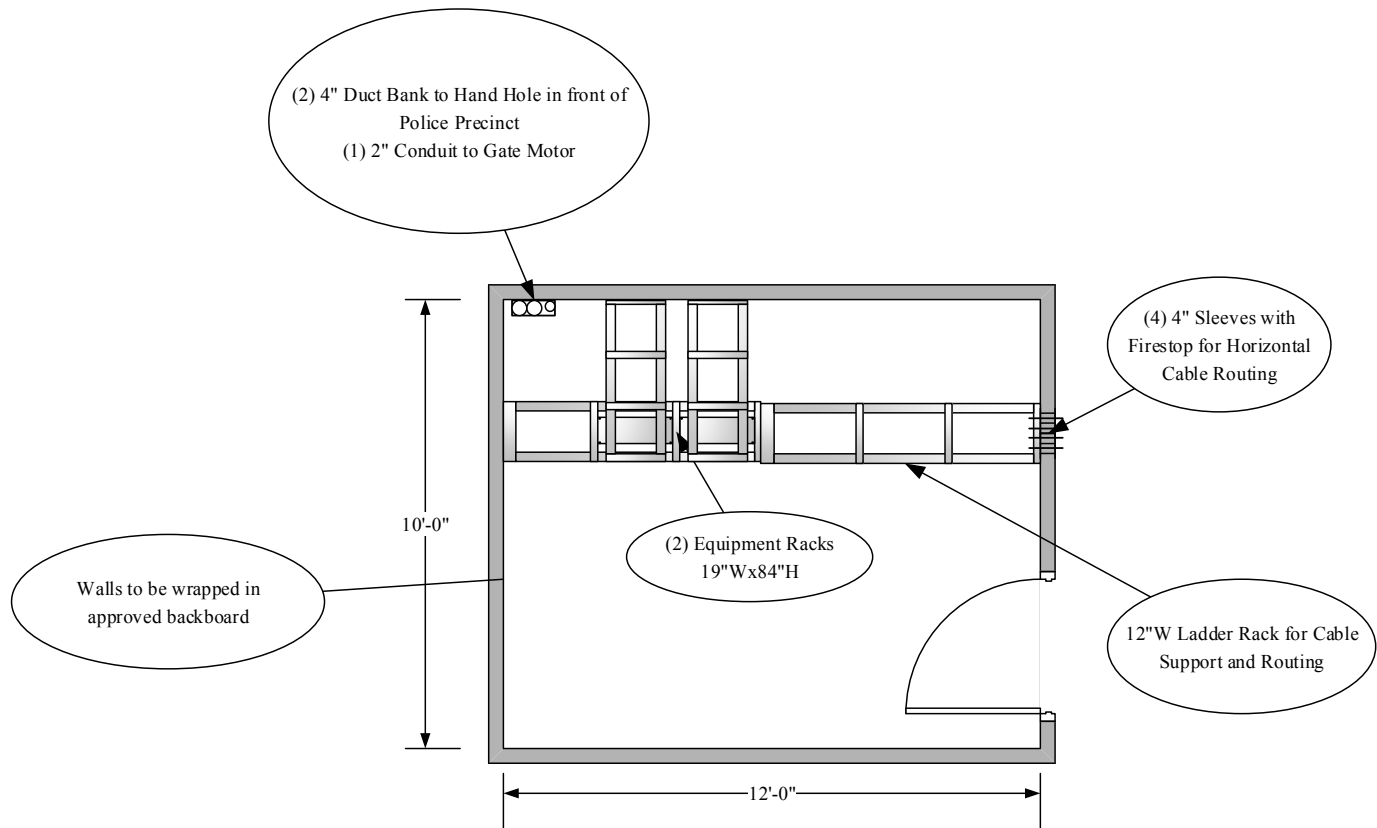
T-Data1 Data, Camera, Access Control Locations

T-Access1 Access Control Door Piping Diagram



Communications Conduit Logical

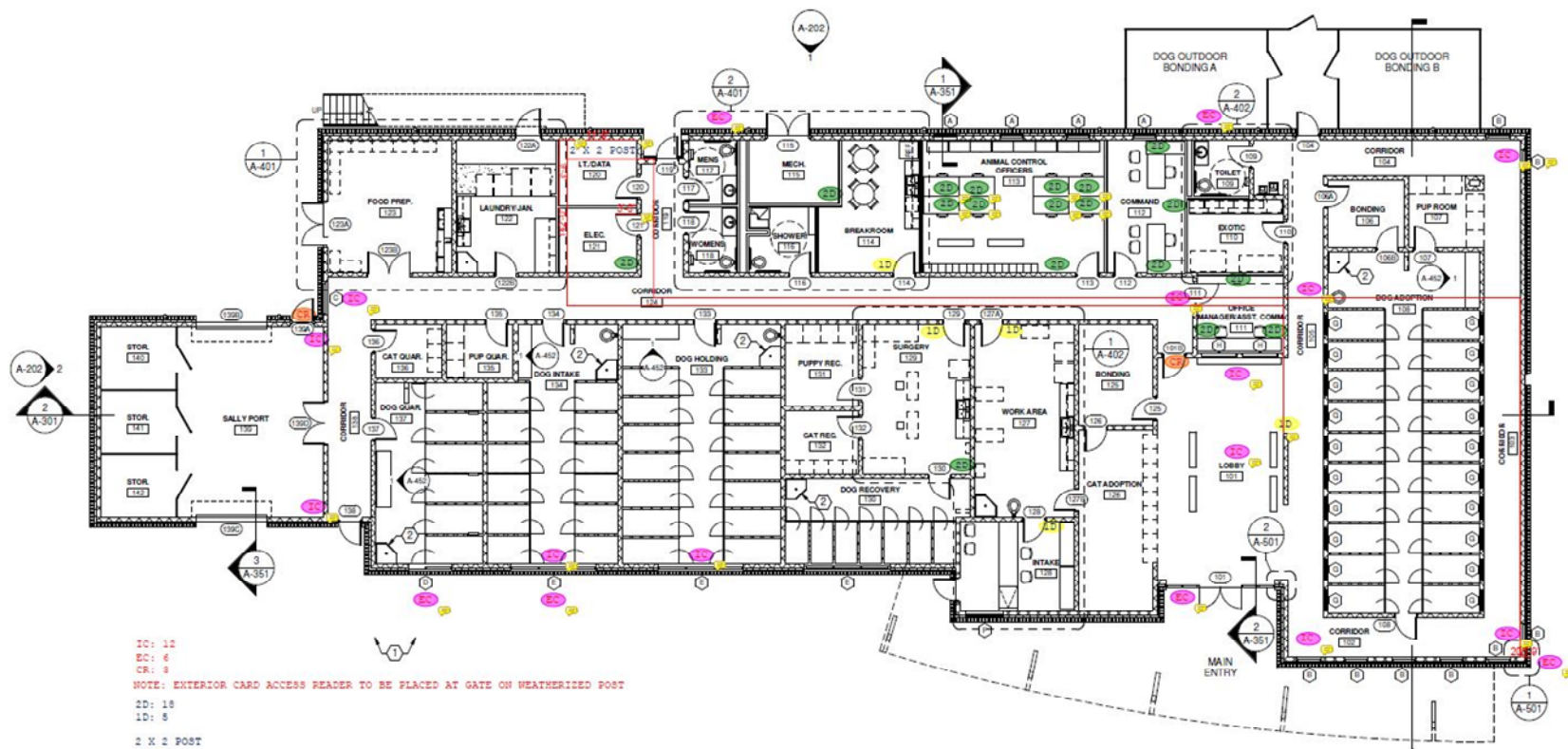
BUILDING: Animal Control Kennel		
DRAWING No: T-CCL	DATE: 7 March 2015	Rev. 1



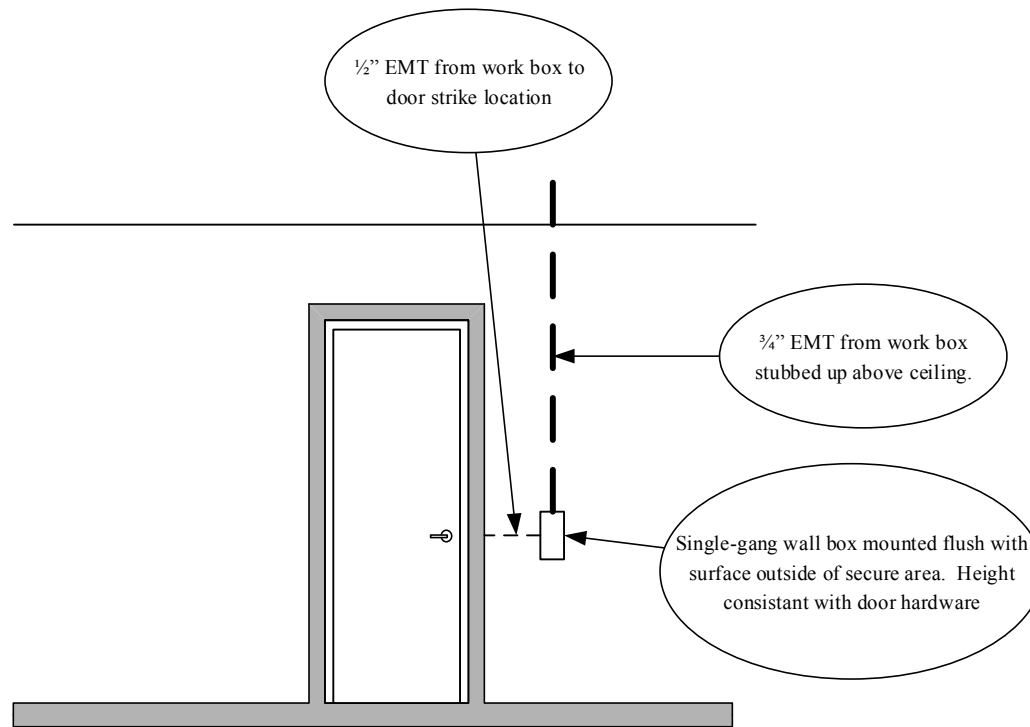
Proposed Layout IT/Data Rm 120

Scale: 1/4" = 1' - 0"

BUILDING:		
Animal Control Kennel		
DRAWING No:	DATE:	Rev.
T-ER1	7 March 2015	1



BUILDING:		
Animal Control Kennel		
DRAWING No:	DATE:	Rev.
T-Data1	7 March 2015	1



Typical Access Control Wiring

For use with doors 101B and 139A

BUILDING:		
Animal Control Kennel		
DRAWING No:	DATE:	Rev.
T-Access1	7 March 2015	1

Telecommunications Room (TRs) Consideration and Guidelines

This document identifies items that must be considered and resolved for an area to be considered as a potential telecommunication room or for an upgrade of an existing telecommunication room. Each building or location will have designated telecommunications rooms where all office networks cabling for a defined area will be terminated. The following requirements have been taken from the EIA-568, BICSI, National Electric Code (NEC) and other specifications. In all cases, the followings items must be met or have a designated method to be resolved. Each set of items have been broken down into the following categories:

- **Location**
- **Size**
- **Environment**
- **Electrical Power**

Each of the above categories identifies the most significant requirements take from the specification groups and documents. This list is neither extensive nor exhaustive for any particular group or item. For full explanations and requirements of a telecommunications room, the individual specification documents should be reviewed.

When installing standardized network cabling in selected NCAR/UCAR buildings, the selection criteria for the location of a telecommunications rooms is the following:

Location

1. Room Obstructions - The area must be free of obstructions that may interfere with the installation of the cable and infrastructure needed to manage the cabling and equipment.
2. Cable Chases - The room must be within 10' of an existing telecommunications closet or major network cabling chase or have an area designated for chase space.
3. Ceiling Obstructions - The room's ceiling or the ceiling around the room cannot be obstructed by air conditioning ducts or electrical conduit unless such space has been determined to be allowable.
4. Cable Distance - The furthest telecommunications outlet must be within 285ft of the designated telecommunications room area.
5. Selected telecommunications area unless it is at least 10' way from any cable paths or racks.
6. Location must be free of water/liquid substance infiltration of any kind.

7. Service Closets - The designated telecommunications area must be near service closets and chases so the cost of extending those services is not excessive.
8. The recommended ceiling height is 8 ft 6 in and false ceilings are not permitted.
9. Interior finishes shall reduce dust, enhance lighting, and provide static-free environment. The floor tiling should be Vinyl Composition Tile (VCT).

Size

1. Acceptable Size - Adequate space must be present in the room for racks, UPS power, air-flow, and hardware installation space.
2. Size Determination - The telecommunications space shall be sized according to the number of outlets serviced by the designated location and the type of networking hardware required including UPS.
3. Additional Space - Extra space shall be designated for special services such as security and other planned devices.
4. Distance Around Equipment - A minimum of three feet is required around telecommunications equipment and racks.
5. Doors to swing outside whenever and the size of doors should be at least 3 feet wide by 80" Tall.
6. The floors of a telecom rooms are specified for a minimum loading of 2.4kPa (50 lbf/sq. ft)

Environment

1. Lighting - adequate lighting is required around racks and punch down boards. Lighting in the telecommunications room should be a minimum of 500 lx (50 foot candles) at the lowest point of termination. Light switch should be easily accessible when entering the room. One light should be emergency lightening if available.
2. Air conditioning - The room should have a controlled air environment which does not allow the room to exhibit temperature extremes. The room must have continuous HVAC control with the temperature being in a range of 50-95 degrees Fahrenheit and positive air pressure.
3. Airflow - Constant 24 hour air-flow is required in the room so the temperature values are not exceeded in the equipment.

Security - The area designated for a telecommunications room must be able to be secured either with a lock or a card reader system. The Telecommunications room shall be dedicated to the Telecommunications function. Access to Telecommunications rooms shall be restricted to authorized service personnel and shall not be shared with building services that may interfere with the telecommunications systems or be used for building maintenance services.

Fire Requirements:

- All penetrations into firewalls or core holes between floors must be properly fire-stopped in accordance with the guidelines in BICSI TDM 95. Penetrations into the surface of any Firewall or presumed Firewall should be only slightly larger than the cable or cables that will need to pass through it. This will make Fire-stopping easier and allow the wall to maintain a better overall structural integrity.
- Proper Fire-stopping should be performed on any hole and/or penetration of a firewall or solid wall. This may include the Contractor installing Mineral Wool in the space between the sheet rock walls and then installing a sheet rock patch on both sides before installing the Fire-Stopping Material.
- Fire-stop any transitions between floor using or not using conduit and sleeve. When using Fire-stopping Putty in a conduit or sleeves between floors a section of Fire-resistant Mineral Wool must be inserted to create the proper base for the putty. Making a form out of cardboard is not acceptable. Fire-stopping pillows are also acceptable to seal an opening that may need to be reentered at a later time.
- All locations must prominently display the documentation of the appropriate fire-stopping system used.
- All fire-stopping applications must comply with local codes.

4. Telecommunications Room Requirements:

The horizontal cross-connect shall consist of rack or wall mounted wiring blocks or panels for termination of copper cables or rack or wall mount interconnect centers or fiber management panels/trays for the termination of optical fibers.

Cross-connect spaces include the labeling of hardware for providing circuit identification and patch cords or cross-connect wire used for creating circuit connections at the cross-connect.

The Telecommunications room shall be equipped to contain Telecommunications equipment, cable terminations, and associated cross-connects.

The Telecommunications room shall be dedicated to the Telecommunications function. Access to Telecommunications rooms shall be restricted to authorized service personnel and shall not be shared with building services that may interfere with the telecommunications systems or be used for building maintenance services.

The Telecommunications Room is generally considered to be a floor serving facility. The horizontal cross-connect links the horizontal subsystem and the backbone subsystem together.

The Telecommunication rooms shall have a minimum dimension of 10 ft. by 12 ft. square.

L-shaped or other shaped dimensions are not acceptable.

Concrete columns in this area are not acceptable.

Electrical Power

1. Power Circuits- Dedicated power is required for both UPS and non-UPS equipment. Separate circuits shall be installed for both types.
2. Power Locations - The UPS power circuit must be within six feet of the designated location of the UPS system within the room.
3. A minimum of two dedicated duplex or two dedicated simplex electrical outlet, each on a separate circuit, should be provided for equipment power. Additional convenience duplex outlets should be placed at 1.8 m (6 ft) intervals around the perimeter walls.

Main Equipment Room (MER) Consideration and Guidelines

The Equipment Room is generally considered to be a building serving facility. The horizontal cross-connect links the horizontal subsystem and the backbone subsystem together.

The Equipment room shall have a minimum dimension of 10 ft. by 12 ft. square.

L-shaped or other shaped dimensions are not acceptable.

Concrete columns in this area are not acceptable.

General

Installation shall meet or exceed all applicable federal, state and local requirements, referenced standards and conform to codes and ordinances of authorities having jurisdiction.

All installation shall be in accordance with manufacturer's published recommendations.

Environmental Limitations: Do not deliver or install equipment frames and cable trays until spaces are enclosed and weather tight, wet work in spaces is complete and dry, and work above ceilings is complete.

Cable Trays

Ladder Racks: Inside the Equipment room and Telecommunications rooms, 18 inch ladder rack is to be used for horizontal wire management. This tray is designated for cabling to remain within these rooms. Any implementation of this ladder rack equipment will include spill brackets at all inside corners.

Cable Tray:

1. The cable tray will be installed parallel to the furred out wall 6 to 12 inches inside the Telecommunications / Equipment rooms. The cable tray will continue into far enough to deliver the riser, station, horizontal, and fiber to the end destination. Cascade transitions (waterfalls) shall be used if height variations occur between the cable tray equipment and the ladder rack equipment.
2. All cable trays inside the Telecommunications / Equipment rooms must be a prefabricated structure consisting of two side rails connected by individual transverse members. Wire mesh type or Mono Mount wire cable tray systems will not be used. The horizontal cable tray system shall be able to support a minimum of 100 lbs of cable per linear foot. Drop-off support for the copper cable going into the frames/racks shall be used.

Outlet Boxes

Outlet boxes shall be assembled as follows:

3. Depth: 3.26 inches.
4. Height: 4.16 inches.
5. Width: 3.51 inches.

Backboards

Backboards: Plywood, fire-retardant treated (both sides), 3/4 by 48 by 96 inches (19 by 1220 by 2440 mm). Comply with requirements for plywood backing panels specified in Division 06.

Plywood should be installed 1 ft. above finished floor.

Equipment Frames

All equipment frames will be placed with their associated vertical and horizontal wire management.

A standard equipment frame foot print, including installed equipment is 26 inch x 8 ft. The 8 ft. measurement is from any obstruction or wall.

Vertical Wire Managers Copper/Fiber

A standard vertical wire manager between equipment frames is 10 inch. If the vertical wire manager is at the end of a row or against a wall, 6 inch wire manager shall be used.

The vertical wire manager shall have separate slack managers for fiber and copper.

Proper drop-off support into the vertical wire manager shall be used. Bars in the ladder rack must be cut and replaced by 'movable cross member' if needed, to establish proper drop-off.

Horizontal Fiber Management

In Equipment rooms only: a 2 inch x 2 inch fiber management system shall be installed above all frames and/or racks and between all rows.

Proper drop-off support into the frames/racks shall be used.

Wall Power Outlets

Wall power outlets shall be 8 inches from finished floor, between finished floor and bottom of plywood.

Site Specific

The Equipment Subsystem consists of shared (common) electronic communications equipment in the equipment room or telecommunications room and the transmission media required to terminate this equipment on distribution hardware.

The equipment room shall be equipped to contain telecommunications equipment, cable terminations, and associated cross-connects.

The equipment room shall not be shared with building services that may interfere with the telecommunications systems or be used for custodial services.

Lighting in the equipment room should be a minimum of 500 lx (50 foot candles) at the lowest point of termination.

A minimum of two dedicated duplex or two dedicated simplex electrical outlet each on a separate circuit should be provided for equipment power. Additional convenience duplex outlets should be placed at 1.8 m (6 ft) intervals around the perimeter walls.

Camera Considerations

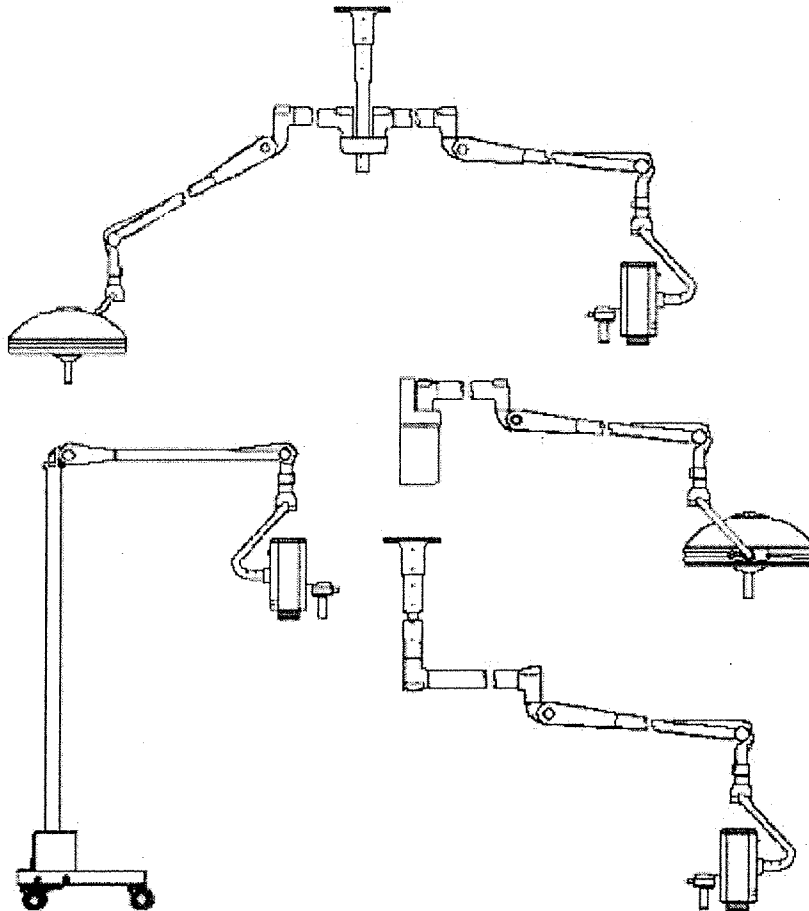
1. Interior cameras:
 - a. Double-gang wall box will need to be mounted flush with surface of all EIFS or Gypsum Ceiling locations on diagram.
 - b. No box will be required in areas with Ceiling Tile Grid.
 - c. Cameras in Sally Port are wall mounted and will need a double-gang box mounted flush with wall surface and will need ½" EMT piped to accessible corridor above ceiling.
2. Exterior Cameras;
 - a. Double-gang box will need to be mounted flush with surface of wall covering at a height of 10 feet for all exterior cameras except over the front door.
 - b. Double-gang box will need to be mounted above front entry door making concessions for front awning.

Access Control Considerations

1. Door 101B
 - a. Single-gang work box will be installed on lobby side of door at a height consistent with the lock hardware.
 - b. One (1) ¾" EMT will need to be stubbed up above the ceiling in corridor 124 and run down to the work box.
 - c. One (1) ½" EMT will need to be run from the work box to the lock location.
 - d. Door lock will be an electronic door strike (HES 1006). Door frame will need to be ordered to accommodate this lock.
2. Door 139A
 - a. Single-gang work box will be installed on lobby side of door at a height consistent with the lock hardware.
 - b. One (1) ¾" EMT will need to be stubbed up above the ceiling in corridor 124 and run down to the work box.
 - c. One (1) ½" EMT will need to be run from the work box to the lock location.
 - d. Door lock will be an electronic door strike (HES 1006). Door frame will need to be ordered to accommodate this lock.
3. Gate Reader
 - a. One (1) 2" conduit will need to be run from the IT/Data Room 120 to the gate motor housing.
 - b. One (1) 1" conduit will need to be run from the gate motor housing to the pedestal on the driver side of the driveway as the vehicle is coming into the gate.

SHOR-LINE®

CUSTOMER AND PRODUCT INFORMATION SURGICAL LIGHTING SYSTEMS



SHOR-LINE

Schroer Manufacturing Company
511 Osage
Kansas City, Kansas 66105, USA
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SHOR-LINE LIMITED

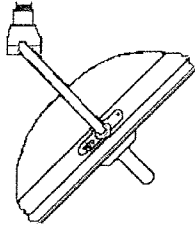
Vale Business Park
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Cowbridge
Vale of Glamorgan
CF71 7PF
Wales, United Kingdom
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Web: www.shor-line.co.uk
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SHOR-LINE CUSTOMER AND PRODUCT INFORMATION SURGICAL LIGHTING SYSTEMS

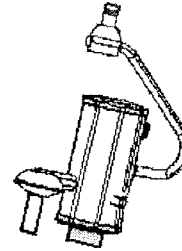
Thank you for allowing Shor-Line to equip and serve you. Our commitment to you is exactly the same as it was in 1927, namely, second to none. Thank you for placing your trust in Shor-Line.

We've designed and tested our Surgical Lighting Systems to ensure years of quality illumination and high performance.

Our suite of surgical lights include:

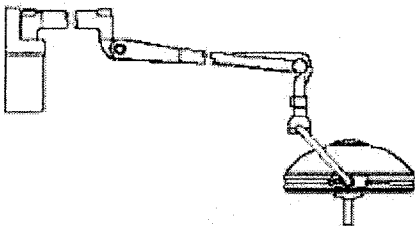


Shor-Line Dome Light

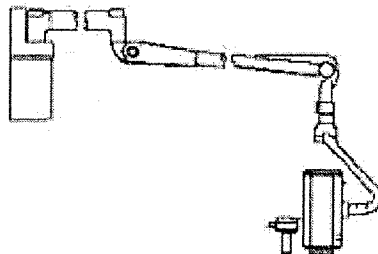


Shor-Line Spot Light

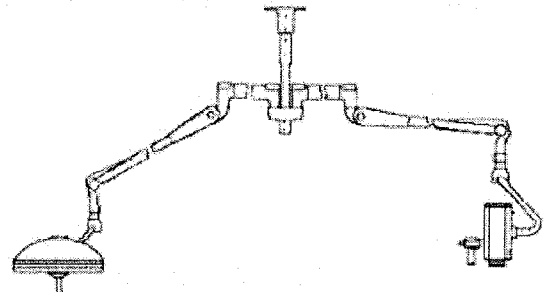
Our mounting options include:



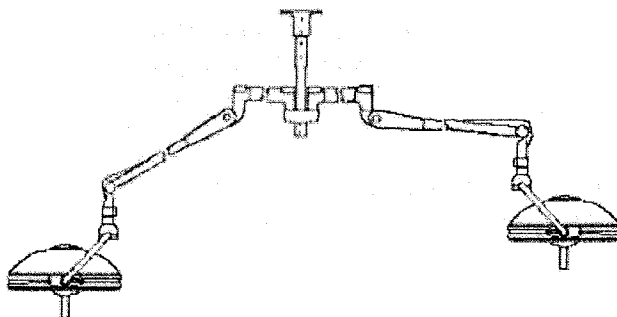
**Shor-Line Wall Mounted
Dome Light
Model #913.5005.03**



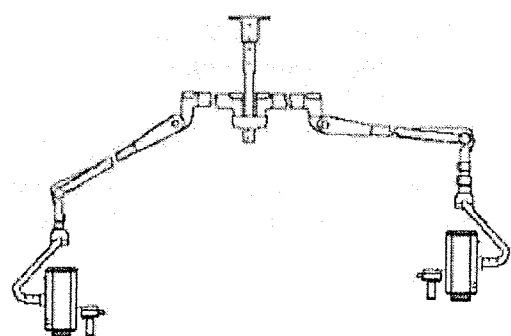
**Shor-Line Wall Mounted
Spot Light
Model #913.5006.03**



**Shor-Line Ceiling Mounted
Combination Dome & Spot Lights
Model #913.5007.01**



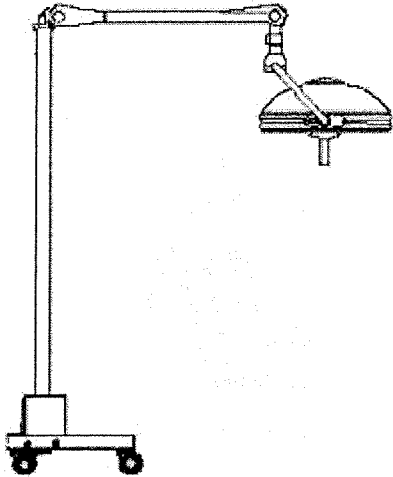
**Shor-Line Ceiling Mounted
Dual Dome Lights
Model #913.5005.02**



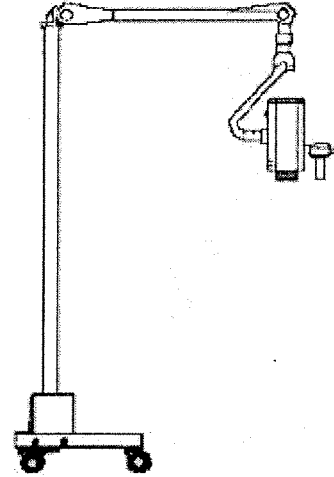
**Shor-Line Ceiling Mounted
Dual Spot Lights
Model #913.5006.05**

SHOR-LINE CUSTOMER AND PRODUCT INFORMATION SURGICAL LIGHTING SYSTEMS

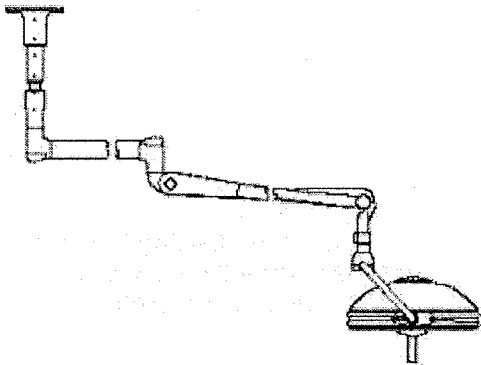
Our mounting options include (continued):



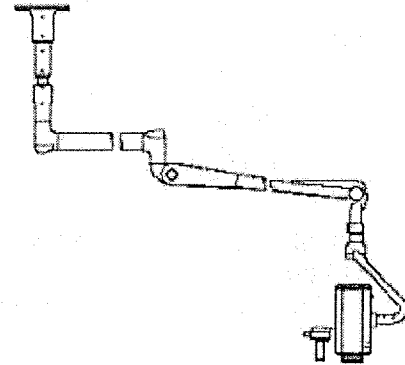
Shor-Line Mobile Stand
120V Dome Light, Model #913.5005.04
240V Dome Light, Model #913.5005.14



Shor-Line Mobile Stand
120V Spot Light, Model #913.5006.04
240V Dome Light, Model #913.5006.14



Shor-Line Ceiling Mounted
Single Dome Light
Model #913.5005.01



Shor-Line Ceiling Mounted
Single Spot Light
Model #913.5006.01

Please note that installation and assembly are different for each scenario. We hope this manual increases your satisfaction with our product, deepens our relationship, and safeguards your investment for years to come.

SHOR-LINE CUSTOMER AND PRODUCT INFORMATION SURGICAL LIGHTING SYSTEMS

This manual provides information on:

	Description	Page
SECTION 1	RECEIVING AND INSPECTING SHIPMENTS	6
SECTION 2	INSTALLATION AND ASSEMBLY <ul style="list-style-type: none"> ▪ Wall Mounted Light System (Option 1) 7 ▪ Mobile Light System (Option 2) 11 ▪ Ceiling Mounted System (Option 3) 13 <ul style="list-style-type: none"> - Single Head Assembly 14 - Dual Head Assembly 19 ▪ Lamp Head to Arm Assembly 24 	
SECTION 3	ADJUSTMENTS AND MAINTENANCE <ul style="list-style-type: none"> ▪ Arm Assembly Adjustment 26 ▪ Bulb Replacement 28 <ul style="list-style-type: none"> - Dome Light - Spot Light 	
SECTION 4	SURGICAL LIGHTING SYSTEM: <ul style="list-style-type: none"> ▪ FUNCTIONALITY 29 ▪ TECHNICAL INFORMATION 30 <ul style="list-style-type: none"> - Component Weights - Assembly Weights - Electrical - Motion Extension ▪ WIRING SCHEMATICS <ul style="list-style-type: none"> - Wall Mounted Dome Light 31 - Wall Mounted Spot Light 32 - Mobile Dome or Spot Light 33 - Ceiling Mounted Dome Light 34 - Ceiling Mounted Spot Light 35 - Ceiling Mounted Combination Dome & Spot Light 36 - Ceiling Mounted Dual Dome Lights 37 - Ceiling Mounted Dual Spot Lights 38 ▪ REPLACEMENT PARTS 39 ▪ TECHNICAL DIAGRAMS <ul style="list-style-type: none"> - Wall Mounted Light System 40 - Mobile Light System 41 - Ceiling Mounted System – Single Head Assembly 42 - Ceiling Mounted System – Dual Head Assembly 43 	
SECTION 5	SHOR-LINE CUSTOMER INFORMATION <ul style="list-style-type: none"> I. Freight Claim & Product Recovery Policy 44 II. Customer Satisfaction Policy 44 III. Product Return Policy 44 IV. Product Repair Policies 45 V. Receiving and Inspecting Shipments 46 VI. Limited Warranty 48 	

▲ WARNING It is required that installation and repair of your Shor-Line light system be performed by a qualified electrician only. Failure can be harmful to the installer, future users, and your investment. Failure will void all warranties.

Your electrician will find installation quick and easy. It is extremely important, however, that the installer first read and then follow these instructions to ensure safety and product performance.

SHOR-LINE CUSTOMER AND PRODUCT INFORMATION

SURGICAL LIGHTING SYSTEMS (continued)

Because installation requires electricity and often heavy equipment, please regard all labels stating

▲ CAUTION and **▲ WARNING**

▲ CAUTION

Indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury.

▲ WARNING

Indicates a potentially hazardous situation which, if not avoided, may result in death or serious injury.

You should consider keeping this manual in a safe and convenient place for future assistance.

If you have questions, experience difficulty, or are interested in other Shor-Line products, contact us. Our Technical Service Department stands ready to assist.

Contact Us:

SHOR-LINE

Schroer Manufacturing Company
511 Osage
Kansas City, Kansas 66105, USA
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e-mail: quality@shor-line.co.uk

SECTION 1: RECEIVING AND INSPECTING SHIPMENTS

⚠ CAUTION Containers and merchandise are heavy and precautions must be taken. Utilize two or more people when unpacking your shipment. We encourage each person to wear a back support.

Step

1. Review Shor-Line's RECEIVING AND INSPECTING SHIPMENTS practices (Page 46).
2. Remove and separate all contents from the shipping containers.
 - Use the EQUIPMENT/PARTS found within each mounting option to ensure nothing has been lost.

If Shortage:

- Document shortages and call Shor-Line immediately so we can expedite shipment. Items missing from your shipment will be forwarded immediately. Reference our FREIGHT CLAIM & PRODUCT RECOVERY POLICY (Page 44).

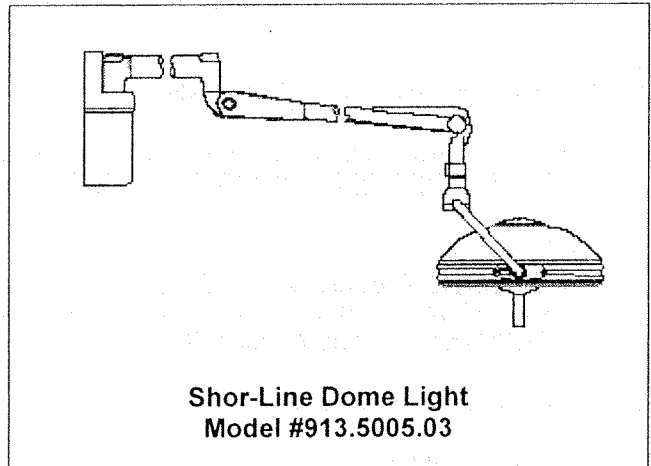
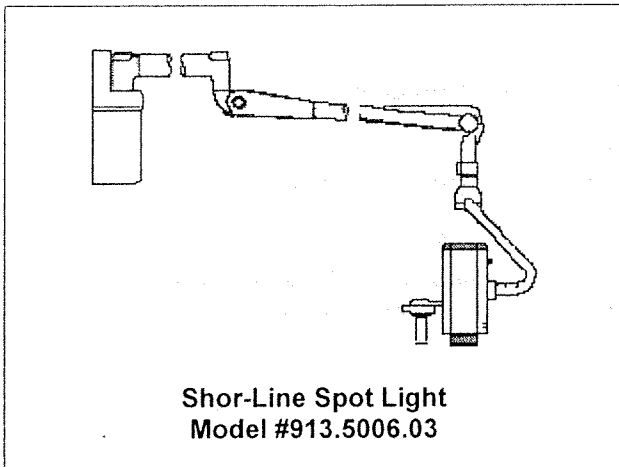
3. Check content for concealed damage.

If Concealed Damage:

- Follow instructions within RECEIVING AND INSPECTING SHIPMENTS (Page 46).
- Call Shor-Line immediately so we can expedite replacements or repairs. Reference our FREIGHT CLAIM & PRODUCT RECOVERY POLICY (Page 44). **Important:** After fifteen (15) calendar days of receipt of merchandise, this policy becomes void.

SECTION 2: INSTALLATION AND ASSEMBLY

WALL MOUNTED LIGHT SYSTEM (OPTION 1)



PRE-INSTALLATION CHECK

IMPORTANT

For the safety of installers and equipment users, Shor-Line requires all installation and repairs be performed by a licensed electrician. Failure to comply will result in a void of all Shor-Line warranties.

EQUIPMENT/PARTS

The shipping carton contains a Wall Mount Assembly, Arm Assembly, Lamp Head Assembly, bag containing a Primary Wiring Harness for one Power Supply, and a bag containing two wood screws (#14x2-1/2" long), two Flat Washers, and one Post Washer.

WARNING

Improper installation of the Wall Mount can cause serious injury and/or property damage. Installation requirements may vary dependent upon the building construction encountered. The mounting hardware supplied is designed for standard wood studs. It is the installers' responsibility to provide any alternative mounting hardware for other types of construction.

- Each mounting joist or support must hold a minimum of 100 pounds.
- Power supply must be routed and wired to the Light System in compliance with all existing codes.
- Power supply lines must be two wire with ground, single phase,
 - For U.S./Canada: 120V.50/60 Hz, capable of supplying 1.5 amps for each light assembly-two wire with ground, single phase 240VAC ~ 50/60 Hz, capable of supplying .8 amps for each light assembly.
 - For Europe: 240V, 50/60 Hz, capable of supplying .8 amps for each light assembly.
- Verify input mains voltage and connect the Power Supply as shown in the electrical diagrams. Improper connection will damage the lamps.
- Maintain proper grounding. Ground wire connections within the wall mount must be fastened at all times.

TOOLS REQUIRED:

- | | | |
|------------------|--------------------------------------|------------------------------|
| • Electric Drill | • Phillips and Flathead Screwdrivers | • Level |
| • 3/16 Drill Bit | • Tape Measure | • Standard Electrician Tools |

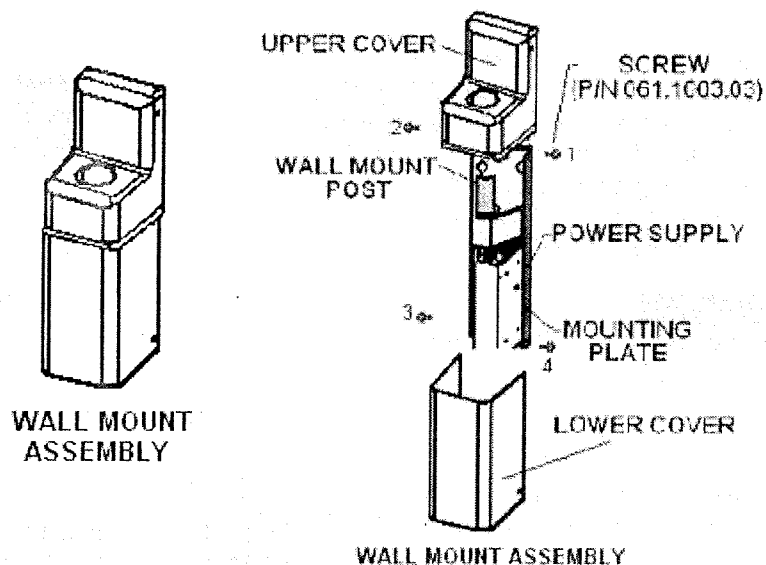
SECTION 2: INSTALLATION AND ASSEMBLY

WALL MOUNTED LIGHT SYSTEM (OPTION 1) – continued

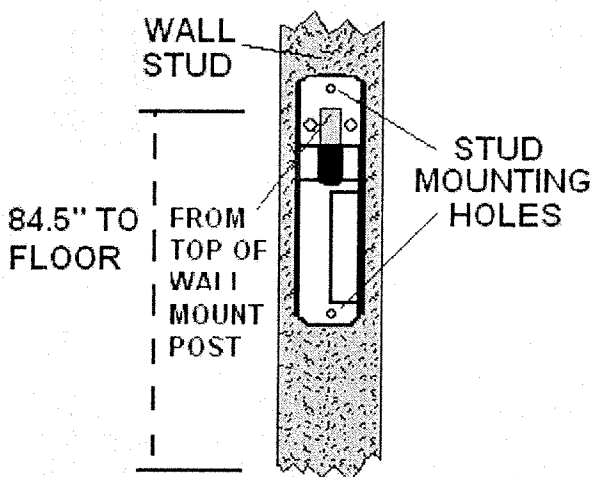
▲ WARNING Turn off electricity to the circuit at this time.

Step

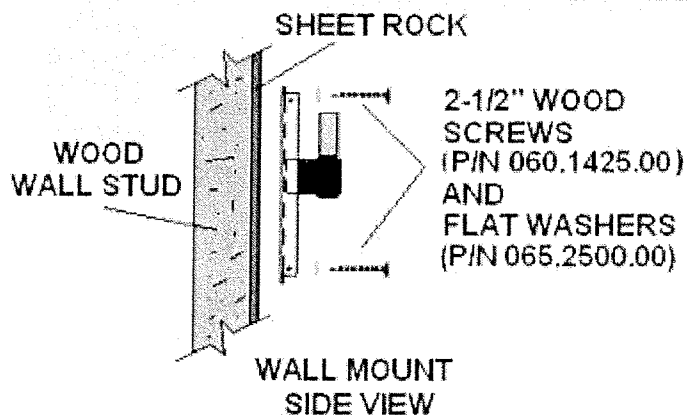
1. Remove the four cover screws and the Upper and Lower Covers from the Wall Mount Assembly.



2. Determine where to attach Mounting Plate.
 - Install to a backing with sufficient support (a wall stud or backing plate).
 - Recommended height is 84.5 inches from floor to top of post.



3. Attach the Mounting Plate at the determined location using the two Wood Screws and two Flat Washers provided.



SECTION 2: INSTALLATION AND ASSEMBLY

WALL MOUNTED LIGHT SYSTEM (OPTION 1) – continued

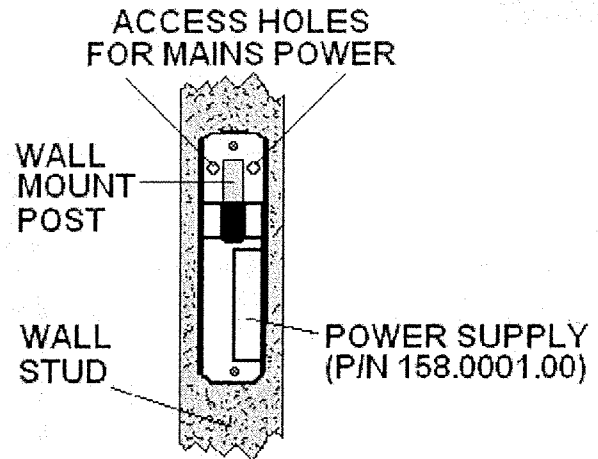
Step

4. Route and secure Main Power Circuit through one of the Mounting Plate's two Access Holes. Join the Input Mains to the Wall Mount Power Supply per the wiring schematic:

- Dome Light - Page 31
- Spot Light – Page 32

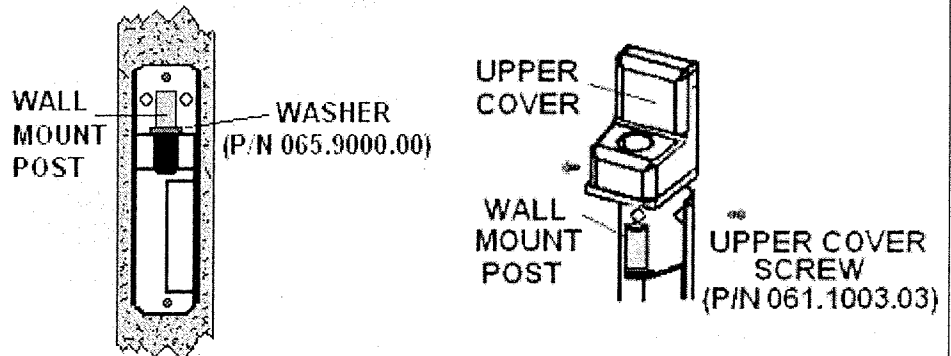
⚠ WARNING

Do not energize circuit at this time.

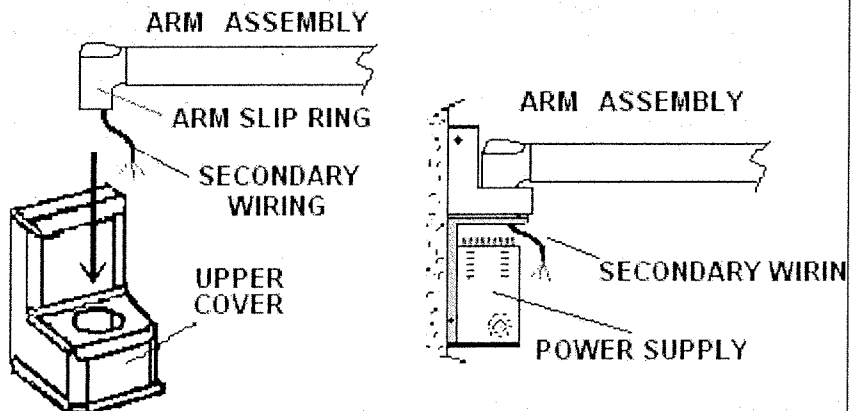


5. Insert Post Washer onto Wall Mount Post.

Re-attach Upper Cover using two screws removed in Step 1.



6. Through the hole on top of the Upper Cover, install the Arm Assembly to Wall Mount Post. At same time, feed the Arm's Secondary Wiring through the shaft of the Wall Mount Post.

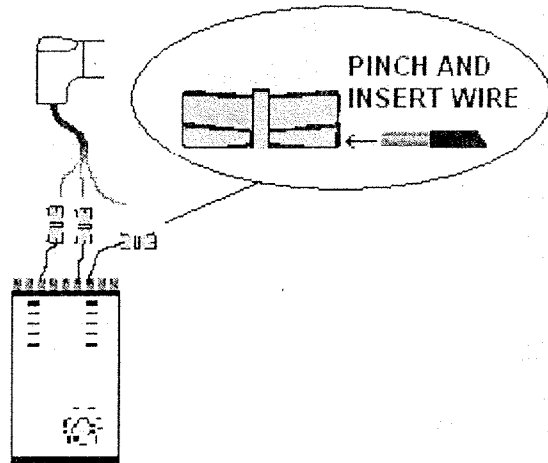


SECTION 2: INSTALLATION AND ASSEMBLY

WALL MOUNTED LIGHT SYSTEM (OPTION 1) – continued

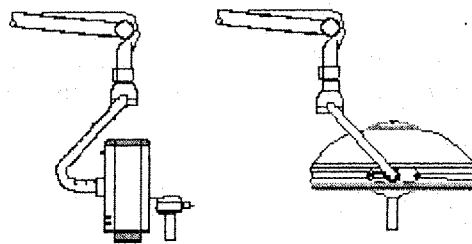
7. Join the Wire Connections from the Arm Assembly to the Wall Mount Power Supply using the three quick fasten Wire Connectors and matching wire colors per the wiring schematic:

- Dome Light - Page 31
- Spot Light – Page 32



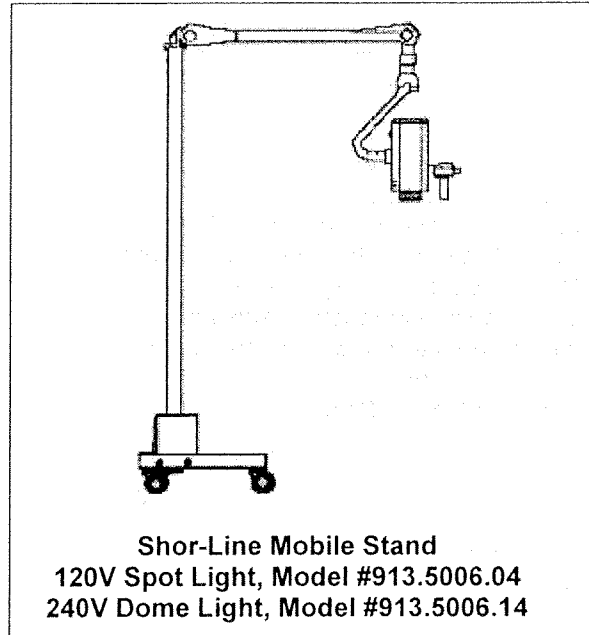
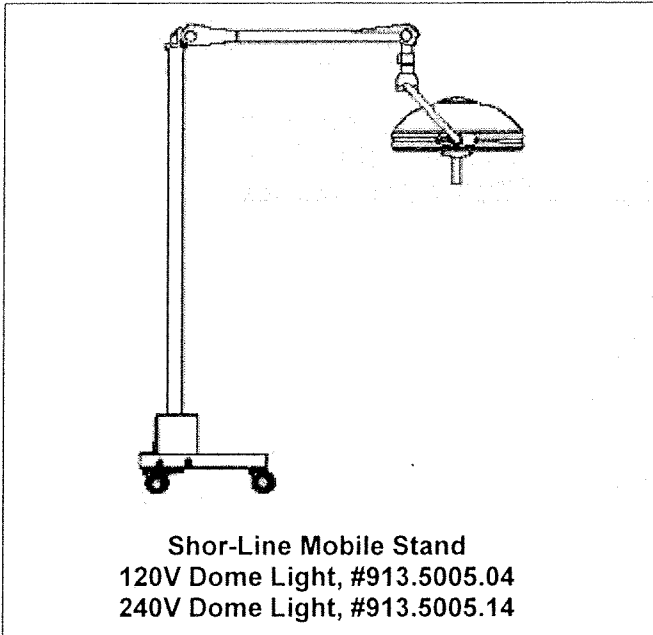
8. Go to LAMP HEAD TO ARM ASSEMBLY (Page 24).

Note: If Arm doesn't hold the Lamp Head (drops) or if the tension is too strong, go to ARM ASSEMBLY ADJUSTMENT on Page 26.



SECTION 2: INSTALLATION AND ASSEMBLY

MOBILE LIGHT SYSTEM (OPTION 2)



IMPORTANT: For the safety of installers and equipment users, Shor-Line requires all installation and repairs be performed by a licensed electrician. Failure to comply will result in a void of all Shor-Line warranties.

EQUIPMENT/PARTS

The shipping carton contains a Floor Base with Upright Post, Arm Assembly, Lamp Head Assembly, Power Cord, and a bag with an Upright Post Washer.

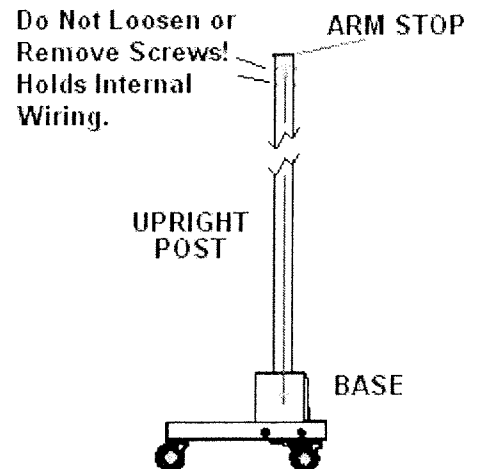
TOOLS REQUIRED:

- Electric Drill
- Phillips and Flathead Screwdrivers
- Level
- 3/16 Drill Bit
- Tape Measure
- Standard Electrician Tools

Step

1. Floor Base with Upright Post is pre-assembled in the factory. Upright Post and Arm Assembly are pre-wired.

CAUTION There are four screws at the top of Upright Post that secure the internal wiring mechanism. Removing these screws will cause the mechanism to slip down the shaft of the Post and you'll lose electrical connectivity.



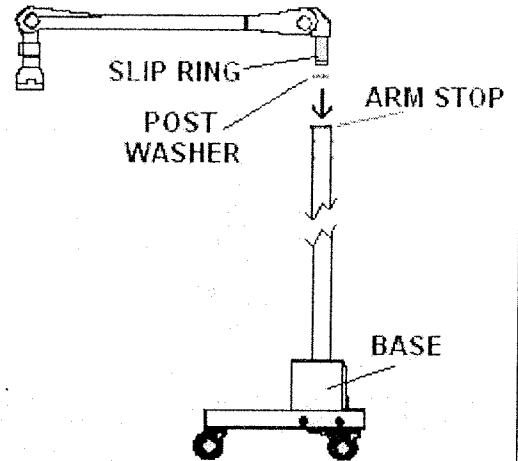
SECTION 2: INSTALLATION AND ASSEMBLY
MOBILE LIGHT SYSTEM (OPTION 2) - continued

Part

2. Insert Upright Post Washer onto the Arm Slip Ring and position Arm Slip Ring into the top of the Upright Post. Keep Arm Assembly level (perpendicular to Post) while lowering Arm Assembly into the shaft of Upright Post.

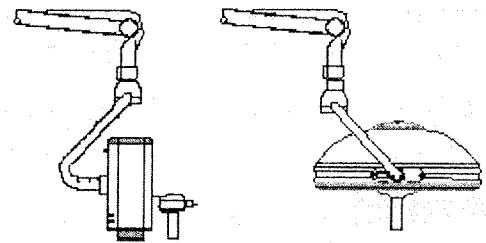
⚠ CAUTION Do not install the Arm Assembly with the Lamp Head Assembly attached. This can cause damage to the light system.

Note: The Arm Stop located at the top of the Upright Post prevents the Arm Assembly from moving more than 160° and maintains the stability of the Mobile Base.

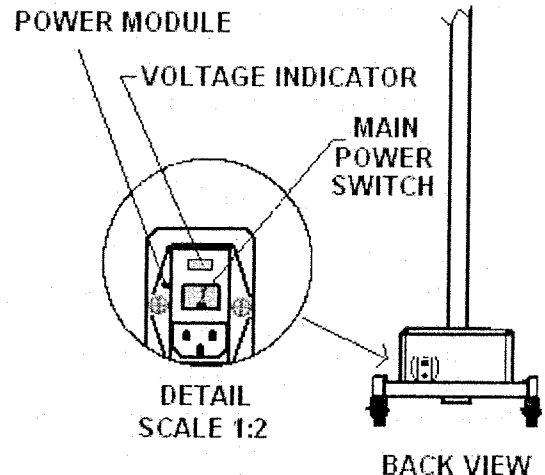


3. Go to LAMP HEAD TO ARM ASSEMBLY (Page 24) to attach Dome or Spot Light.

Note: If Arm doesn't hold the Lamp Head (drops) or if the tension is too strong, go to ARM ASSEMBLY ADJUSTMENT on Page 26.

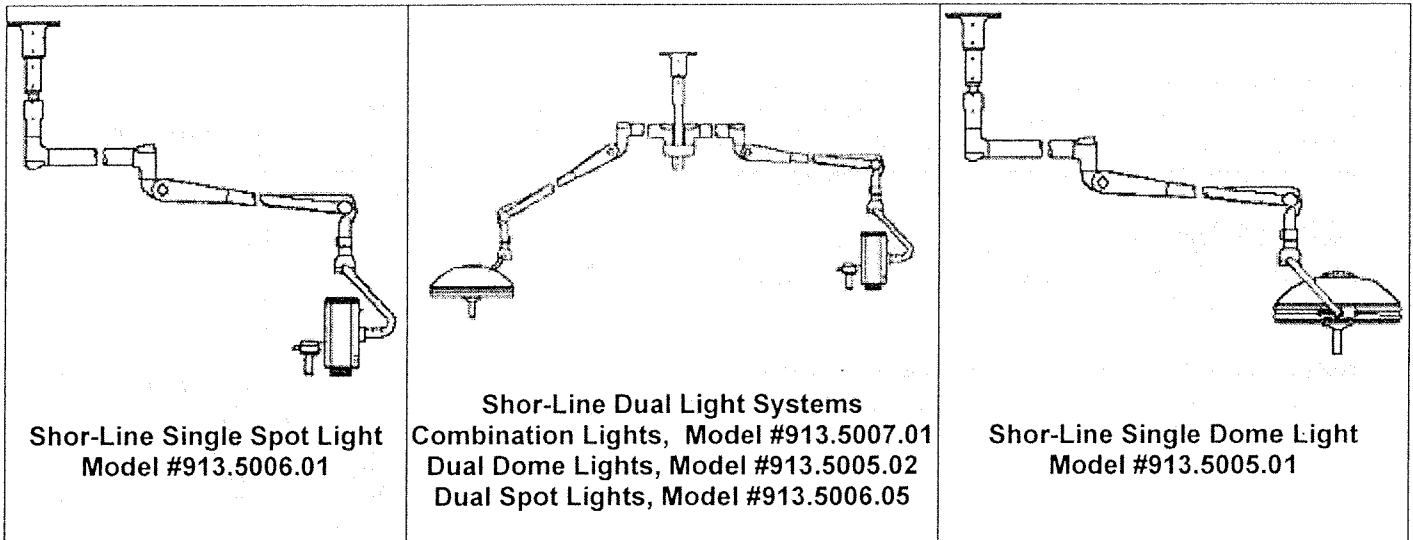


4. Verify voltage on the Voltage Indicator.
5. Plug Main Power Cord into the Receptacle on Power Module located at the back of the Floor Base.
6. Connect Power Cord to an electric outlet and verify operation. NOTE: Both the Main Power Switch located on the Floor Base and Lamp Head Switch located on the lamp must be "ON" to operate.



SECTION 2: INSTALLATION AND ASSEMBLY

CEILING MOUNTED LIGHT SYSTEM (OPTION 3)



PRE-INSTALLATION CHECK (SINGLE AND DUAL HEADS)

IMPORTANT: For the safety of installers and equipment users, Shor-Line requires all installation and repairs be performed by a licensed electrician. Failure to comply will result in a void of all Shor-Line warranties.

⚠ CAUTION Single and Dual Ceiling Mounted Systems are heavy. Precautions must be taken. Utilize two or more people when installing. We encourage each person to wear a back support.

⚠ WARNING Improper installation of Single and Dual Ceiling Mounted Systems can cause serious injury and/or property damage. Installation requirements may vary dependent upon the building construction encountered. The mounting hardware supplied is designed for standard wood studs. It is the installers' responsibility to provide any alternative mounting hardware for other types of construction.*

Check to insure all specification requirements are met:

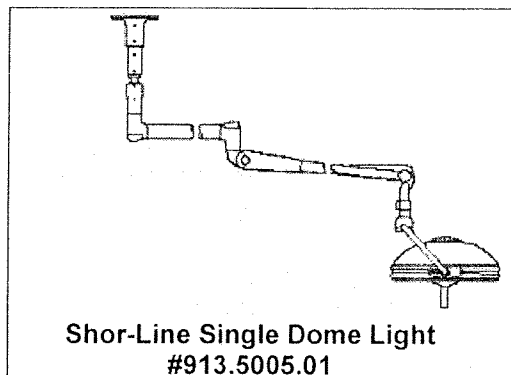
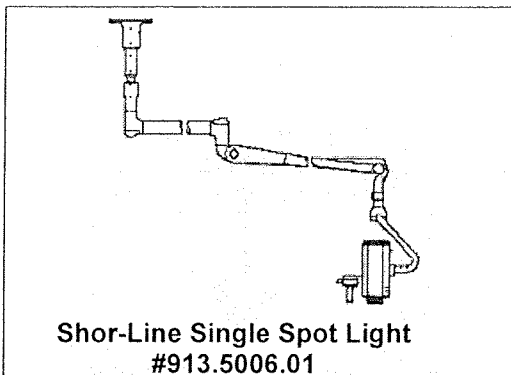
- Each mounting joist or support must hold a minimum of 100 pounds.
- The mounting joists or support are on 16" centers so it can accommodate the junction box (word) with dimensions of:
 - Length: 14.25 inches (362 mm) - Width: 8.00 inches (204 mm) - Depth: 5.50 inches (140 mm)
- Power supply must be routed and wired to the Light System in compliance with all existing codes.
- Power supply lines must be two wire with ground, single phase,
 - For U.S./Canada: 120V.50/60 Hz, capable of supplying 1.5 amps for each light assembly-two wire with ground, single phase 240VAC ~ 50/60 Hz, capable of supplying .5 amps for each light assembly.
 - For Europe: 240V, 50/60 Hz, capable of supplying .8 amps for each light assembly.
- Verify input mains voltage and connect the Power Supply(ies) as shown in the electrical diagrams. Improper connection will damage the lamps.
- Maintain proper grounding. Ground wire connections within the wall mount must be fastened at all times.
- Light Mount Column supplied and make sure it is the proper length to install and operate the Light System without interference or over reach.

TOOLS REQUIRED:

- | | | |
|--|--|---|
| <ul style="list-style-type: none"> • Electric Drill • 3/16 Drill Bit | <ul style="list-style-type: none"> • Phillips and Flathead Screwdrivers • Tape Measure | <ul style="list-style-type: none"> • Level • Standard Electrician Tools |
|--|--|---|

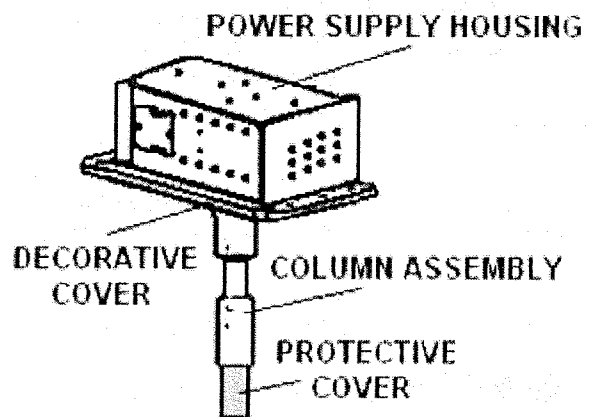
SECTION 2: INSTALLATION AND ASSEMBLY

CEILING MOUNTED LIGHT SYSTEM (OPTION 3) FOR SINGLE HEAD ASSEMBLY



EQUIPMENT/PARTS

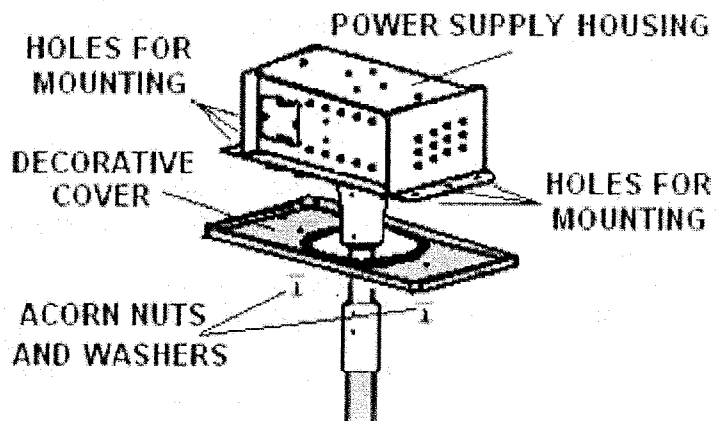
The shipping carton contains a Power Supply Housing (with Decorative Cover) and Column Assembly (with Washers and Retaining Ring inside top of Protective Cover), Single Arm Assembly, Lamp Head Assembly, bag of containing single harness for one Power Supply, and a bag with six wood screws. **Note:** All installation hardware is packed in Power Supply Housing.



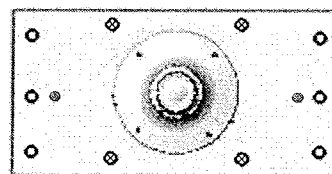
⚠ WARNING Turn off electricity to the circuit at this time.

Step

1. Remove the two Acorn Nuts and the two Flat Washers that secure the Decorative Cover to the Power Supply Housing and remove the Decorative Cover.



Note the six holes on the outside perimeter of the Power Supply Housing that will be used for mounting the light system.



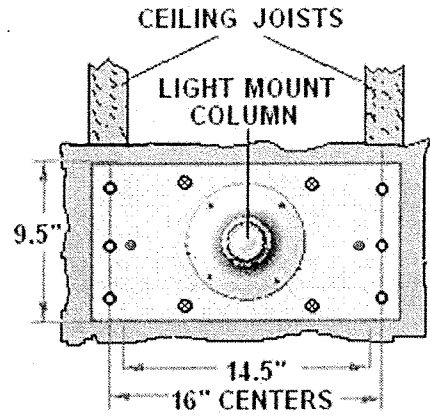
SECTION 2: INSTALLATION AND ASSEMBLY

CEILING MOUNTED LIGHT SYSTEM (OPTION 3) FOR SINGLE HEAD ASSEMBLY - continued

Step

2. Prior to installation, locate the ceiling joists.
 - The Power Supply Housing has six holes provided for ceiling joist on 16 inch (406mm) centers. If necessary, cut hole in the sheet rock 9.5" x 14.5".
 - Mindful of safety precautions, lift the Power Supply Housing to the ceiling and using the holes as templates, pre-drill six holes into the ceiling joists (use 3/16 drill bit).

⚠ WARNING The column is heavy and must be held up for a several minutes. Two or more installers required for this step.

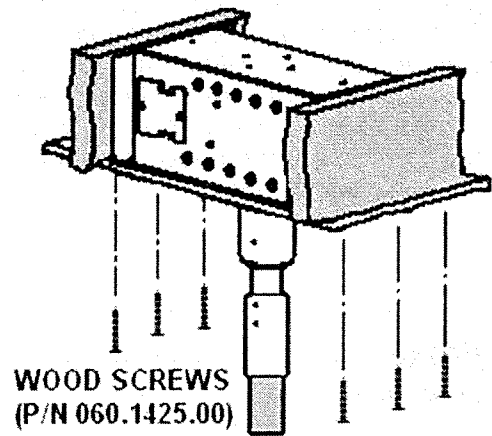


VIEW LOOKING UP AT CEILING

3. Secure the Power Supply Housing to the ceiling joists using a 2-1/2" Wood Screw at each of the six holes on the Power Supply Housing.

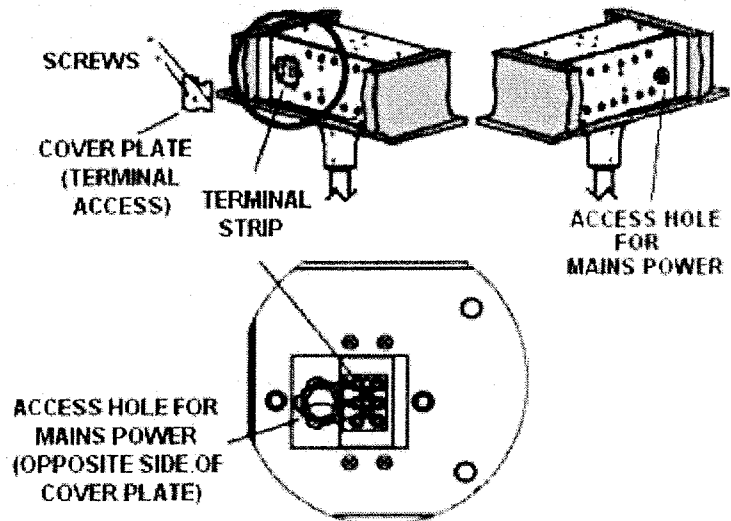
The holes were predrilled in the previous step.

⚠ WARNING If the Power Supply Housing is not properly secured to the ceiling joists, it may result in a mounting system failure causing the light to fall from the ceiling. All six screws must be used according to specifications.



4. After installing the Power Supply Housing into the ceiling, connect Mains Power Wiring:

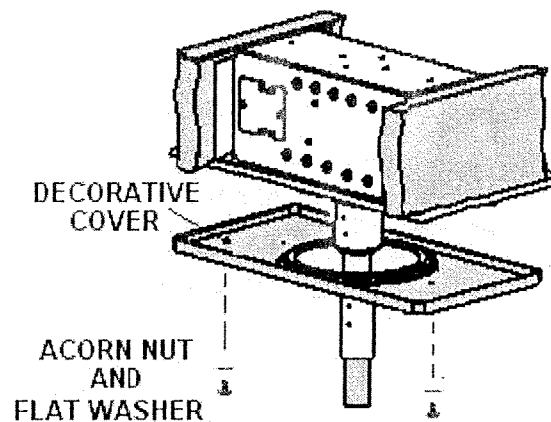
- Remove the Cover Plate (two screws and washers) to access Terminal Strip.
- Route and secure Mains Power through the Access Hole located on the backside of the Power Supply Housing.
- Attach the Main Power Lines to the Terminal Strip at the designated locations for ground, neutral, and load. See wiring schematic:
 - Dome Light - Page 34
 - Spot Light - Page 35
- Re-attach the Cover Plate.



SECTION 2: INSTALLATION AND ASSEMBLY
CEILING MOUNTED LIGHT SYSTEM (OPTION 3)
FOR SINGLE HEAD ASSEMBLY - continued

Step

5. Re-attach the Decorative Cover using the two Acorn Nuts and Flat Washers removed in Step 1.

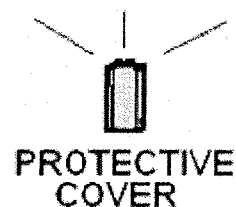
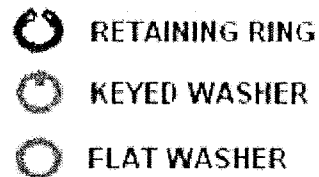
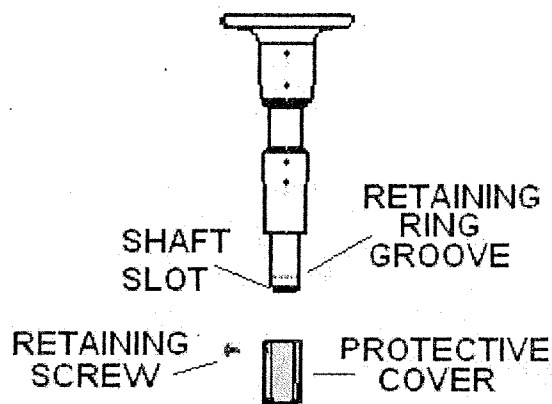


6. Installation of Arm Assembly:

⚠ WARNING Light System should still not be energized at this time.

⚠ CAUTION Do not install the Arm Assembly with the Lamp Head Assembly attached. This can cause damage to the light system.

- Loosen the Retaining Screw and pull off the plastic Protective Cover from the Light Mount Column Shaft. (Note the Retaining Ring groove cut around the top of the Column Shaft and the slot cut out for the Keyed Washer.)
- Remove the Retaining Ring, Keyed Washer, and Flat Washer located in the outer top of the Protective Cover. Use retaining ring pliers to remove the Retaining Ring and release the Washers.

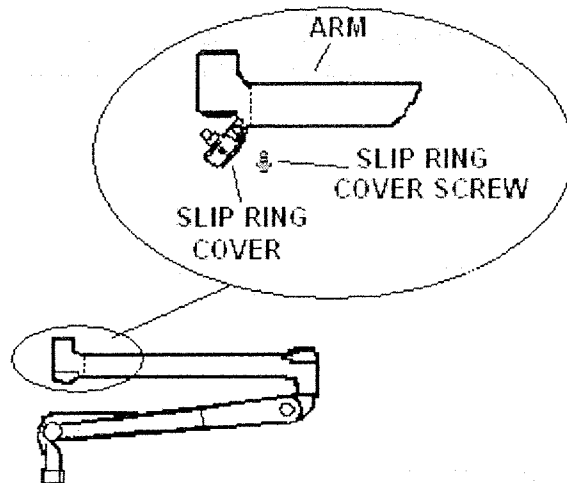


SECTION 2: INSTALLATION AND ASSEMBLY

CEILING MOUNTED LIGHT SYSTEM (OPTION 3) FOR SINGLE HEAD ASSEMBLY - continued

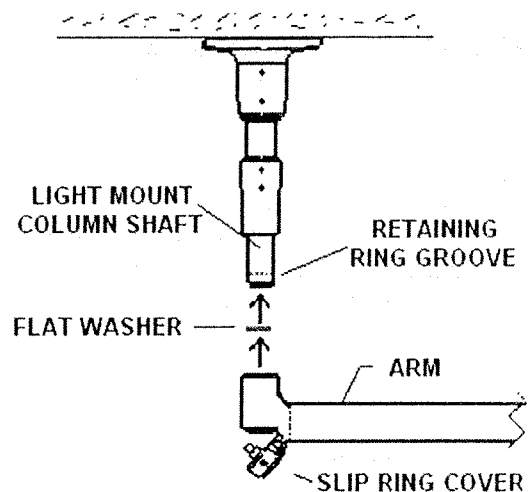
Step

7. Before installing the Arm Assembly, remove the screw in the Arm Slip Ring Cover and gently lift the Slip Ring Cover back until the Slip Ring has been pulled completely out of the Arm Assembly.

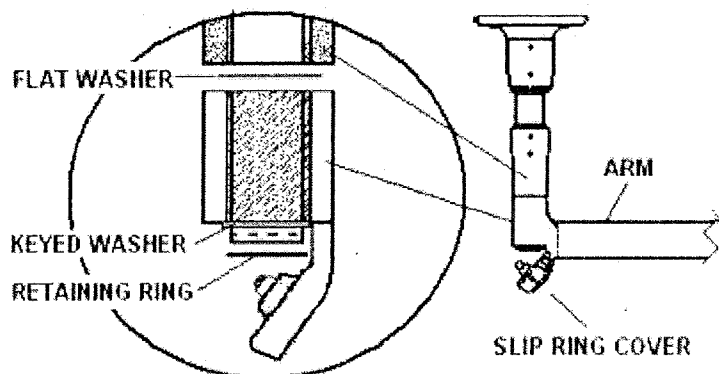


8. Place the Flat Washer onto the Light Mount Column Shaft and then mount Arm Assembly. Keep Arm Assembly level (perpendicular to Column) while positioning onto the Column Shaft. Raise Arm until the Light Mount Column Shaft protrudes (see next bullet).

⚠ WARNING The Arm Assembly is heavy and must be held up for a several minutes. Assembly requires two or more people.



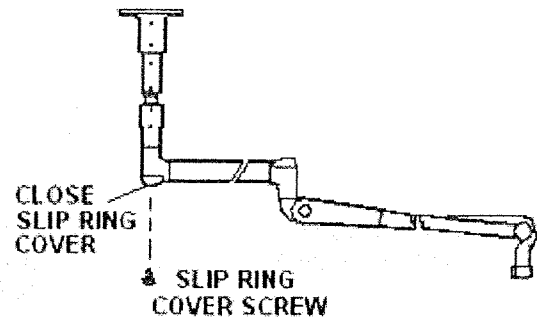
9. Align the Keyed Washer with the cutout portion of the protruding Shaft and attach. Place the Retaining Ring onto the Shaft and push upwards until it locks into Shaft Retaining Ring groove – thus locking the Arm Assembly to the Light Mount Column.



SECTION 2: INSTALLATION AND ASSEMBLY

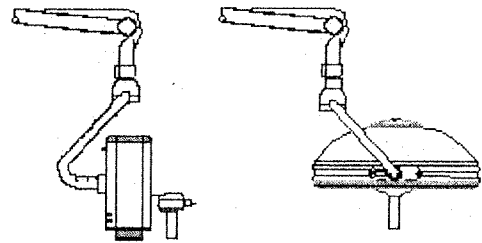
CEILING MOUNTED LIGHT SYSTEM (OPTION 3) FOR SINGLE HEAD ASSEMBLY - continued

10. Re-assemble the Slip Ring, Slip Ring Cover and Slip Ring Cover Screw. BE CAREFUL – not to bend or distort the Slip Ring.



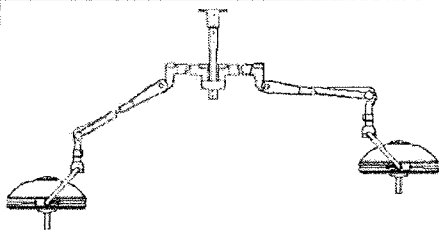
11. Go to LAMP HEAD TO ARM ASSEMBLY (Page 24) to attach Dome or Spot Light.

Note: If Arm doesn't hold the Lamp Head (drops) or if the tension is too strong, go to ARM ASSEMBLY ADJUSTMENT on Page 26.

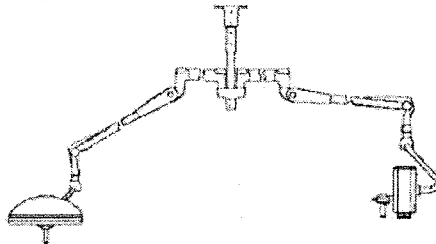


SECTION 2: INSTALLATION AND ASSEMBLY

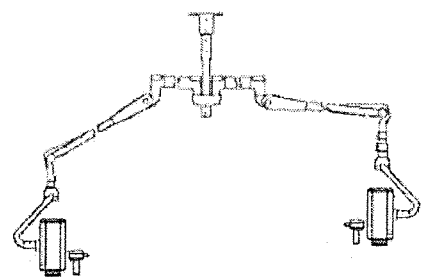
CEILING MOUNTED LIGHT SYSTEM (OPTION 3) FOR DUAL HEAD ASSEMBLY



Shor-Line Dual Dome Lights
Model #913.5005.02



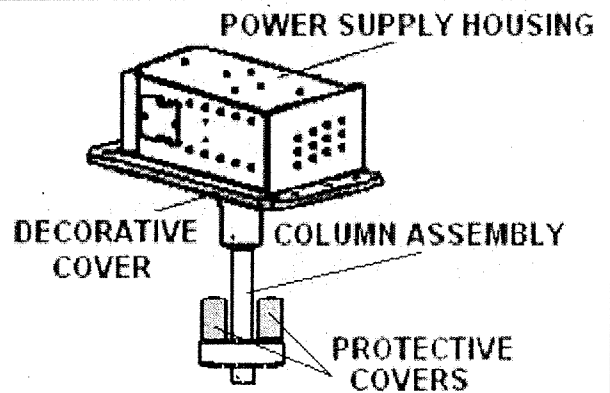
**Shor-Line Combination
Dome & Spot Lights**
Model #913.5007.01



Shor-Line Dual Spot Lights
Model #913.5006.05

EQUIPMENT/PARTS

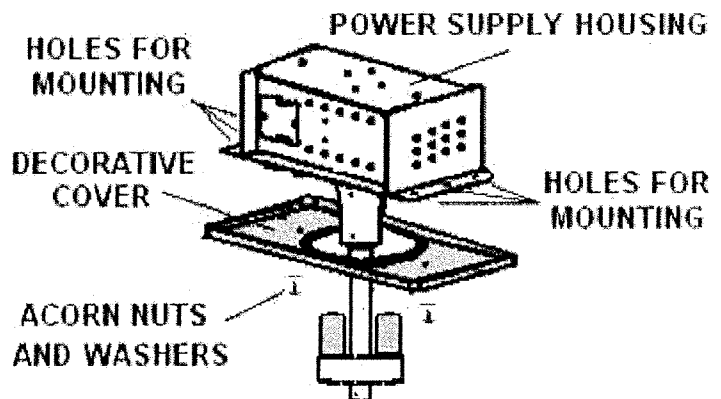
The shipping carton contains a Power Supply Housing (with Decorative Cover) and Column Assembly, Dual Arm Assembly with Washers and Retaining Ring inside plastic Protective Cover, Two Lamp Head Assemblies, Bag of containing double harness for two Power Supplies, and a bag with six wood screws. **Note:** All installation hardware is packed in Power Supply Housing.



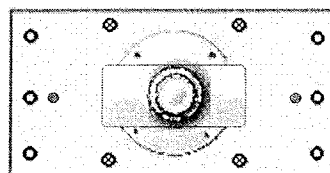
⚠ WARNING Turn off electricity to the circuit at this time.

Step

1. Remove the two Acorn Nuts and the two Flat Washers that secure the Decorative Cover to the Power Supply Housing and remove the Decorative Cover.



Note the six holes on the outside perimeter of the Power Supply Housing that will be used for mounting the light system.



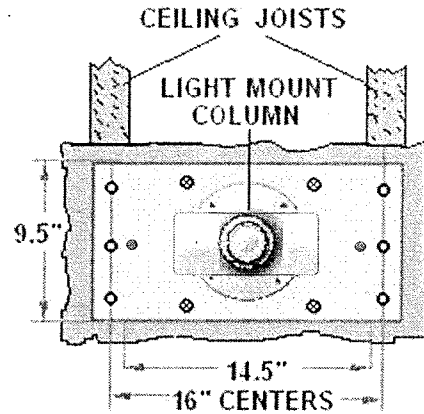
TOP VIEW
POWER SUPPLY HOUSING
AND COLUMN ASSEMBLY

SECTION 2: INSTALLATION AND ASSEMBLY

CEILING MOUNTED LIGHT SYSTEM (OPTION 3) FOR DUAL HEAD ASSEMBLY - continued

2. Prior to installation, locate the ceiling joists.
 - The Power Supply Housing has six holes provided for ceiling joist on 16 inch (406mm) centers. If necessary, cut hole in the sheet rock 9.5" x 14.5".
 - Mindful of safety precautions, lift the Power Supply Housing to the ceiling and using the holes as templates, pre-drill six holes into the ceiling joists (use 3/16 drill bit).

⚠ WARNING The column is heavy and must be held up for a several minutes. Two or more installers required for this step.

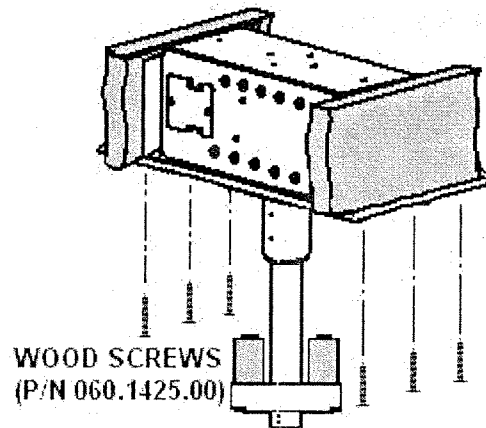


VIEW LOOKING UP AT CEILING

3. Secure the Power Supply Housing to the ceiling joists using a 2-1/2" Wood Screw at each of the six holes on the Power Supply Housing.

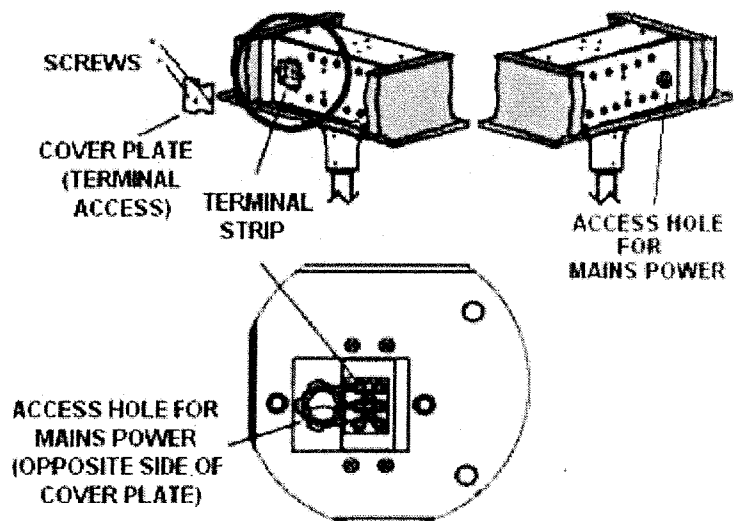
The holes were predrilled in the previous step.

⚠ WARNING If the Power Supply Housing is not properly secured to the ceiling joists, it may result in a mounting system failure causing the light to fall from the ceiling. All six screws must be used according to specifications.



4. After installing the Power Supply Housing, connect Mains Power Wiring:

- Remove the Cover Plate (two screws and washers) to access Terminal Strip.
- Route and secure Mains Power through the Access Hole located on the backside of the Power Supply Housing.
- Attach the Main Power Lines to the Terminal Strip at the designated locations for ground, neutral, and load. See wiring schematic:
 - Combination Dome & Spot - Page 36
 - Dual Dome Lights - Page 37
 - Dual Spot Lights - Page 38
- Re-attach the Cover Plate.

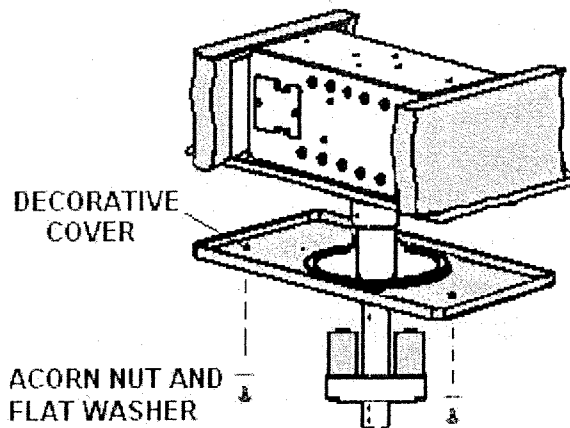


SECTION 2: INSTALLATION AND ASSEMBLY

CEILING MOUNTED LIGHT SYSTEM (OPTION 3) FOR DUAL HEAD ASSEMBLY - continued

Step

5. Re-attach the Decorative Cover using the two Acorn Nuts and Flat Washers removed in Step 1.

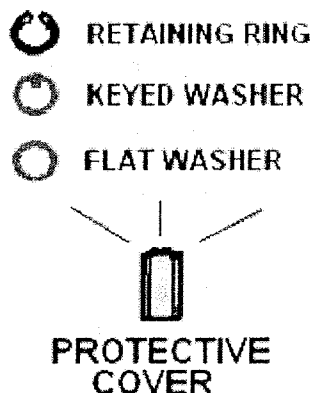
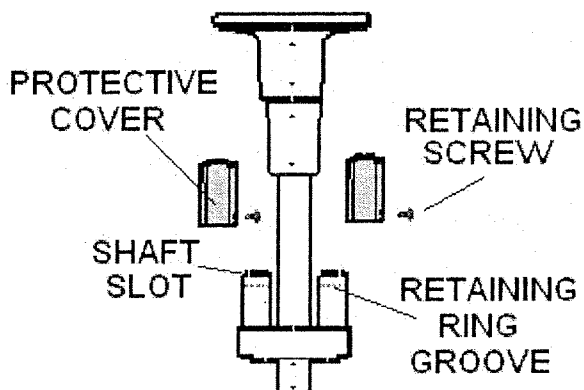


6. Installation of Arm Assemblies:

⚠ WARNING Light System should still not be energized at this time.

⚠ CAUTION Do not install the Arm Assemblies with the Lamp Head Assemblies attached. This can cause damage to the light system.

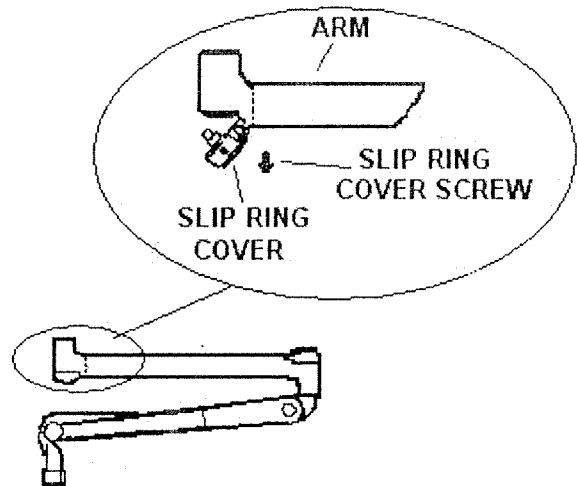
- Loosen the Retaining Screws and pull off the two plastic Protective Covers from the Light Mount Column Shafts. (Note the Retaining Ring grooves cut around the tops of the Column Shafts and the slots cut out for the Keyed Washers.)
- Remove the Retaining Rings, Keyed Washers, and Flat Washers located in the outer tops of the Protective Covers. Use retaining ring pliers to remove the Retaining Rings and release the Washers.



SECTION 2: INSTALLATION AND ASSEMBLY

CEILING MOUNTED LIGHT SYSTEM (OPTION 3) FOR DUAL HEAD ASSEMBLY - continued

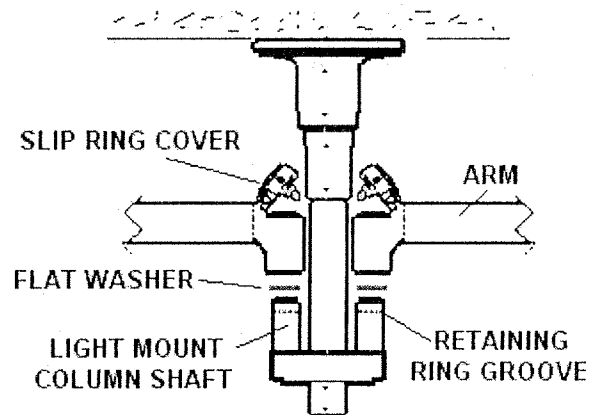
7. Before installing the Arm Assemblies, remove the screws in the Arm Slip Ring Covers and gently lift the Slip Ring Covers back until the Slip Rings have been pulled completely out of the Arm Assemblies.



8. Place a Flat Washer onto one of the Light Mount Column Shafts and mount Arm Assembly. Keep Arm Assembly level (perpendicular to Column) while positioning onto the Column Shaft. Raise Arm until the Light Mount Column Shaft protrudes.

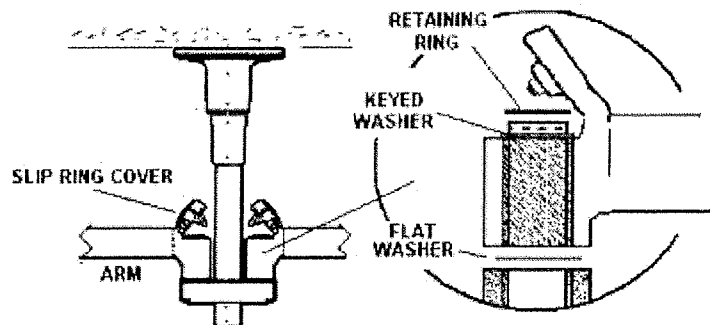
⚠ WARNING The Arm Assembly is heavy and must be held up for a several minutes. Assembly requires two or more people.

Repeat for other Arm.



9. Align the Keyed Washer with the cutout portion of the protruding Shaft and attach. Place the Retaining Ring onto the Shaft and push upwards until it locks into Shaft Retaining Ring groove – thus locking the Arm Assembly to the Light Mount Column.

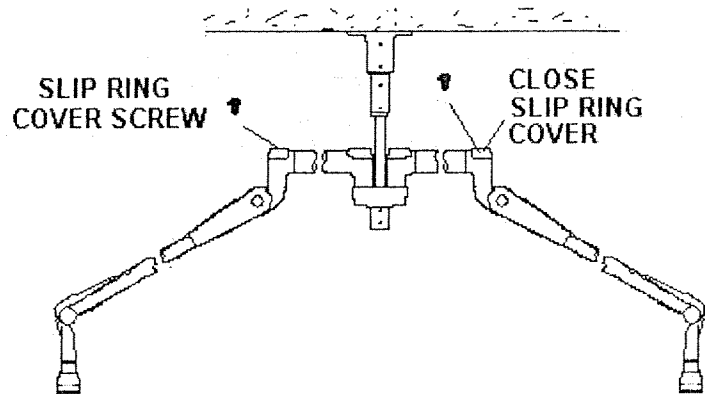
- Follow same instructions for other Arm Assembly.



SECTION 2: INSTALLATION AND ASSEMBLY

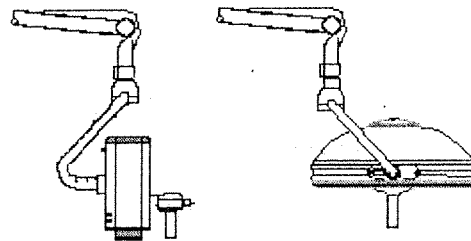
CEILING MOUNTED LIGHT SYSTEM (OPTION 3) FOR DUAL HEAD ASSEMBLY - continued

10. Re-assemble both Slip Rings, Slip Ring Covers and Slip Ring Cover Screws. BE CAREFUL – not to bend or distort the Slip Rings.



11. Go to LAMP HEAD TO ARM ASSEMBLY (Page 24) to attach Dome or Spot Light.

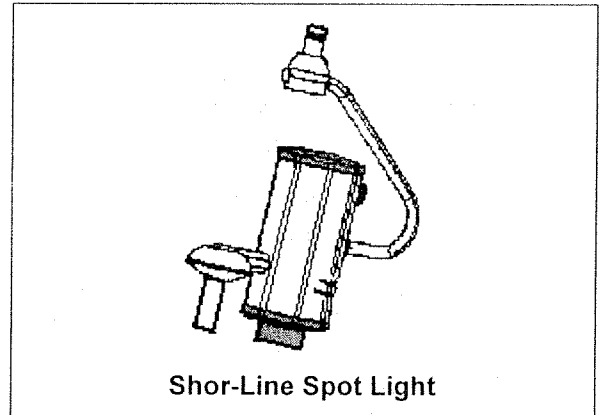
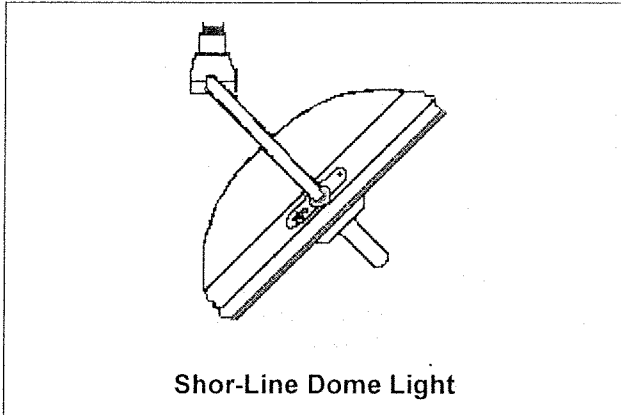
Note: If Arm doesn't hold the Lamp Head (drops) or if the tension is too strong, go to ARM ASSEMBLY ADJUSTMENT on Page 26.



SECTION 2: INSTALLATION AND ASSEMBLY

LAMP HEAD TO ARM ASSEMBLY

When ordering, you had two lamp heads to choose from:



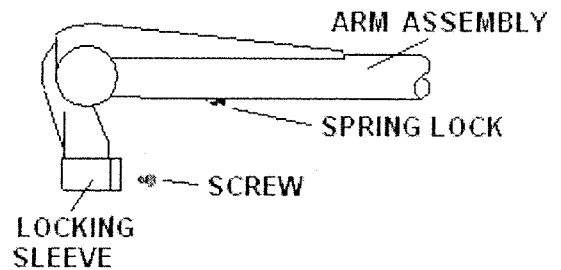
Assembly for the two products are the same regardless of the type of mounting. The Lamp Head and Arm Assembly have been pre-wired in our factory so parts merely need to be fit and connected for illumination.

IMPORTANT: For the safety of installers and equipment users, Shor-Line requires all installation and repairs be performed by a licensed electrician. Failure to comply will result in a void of all Shor-Line warranties.

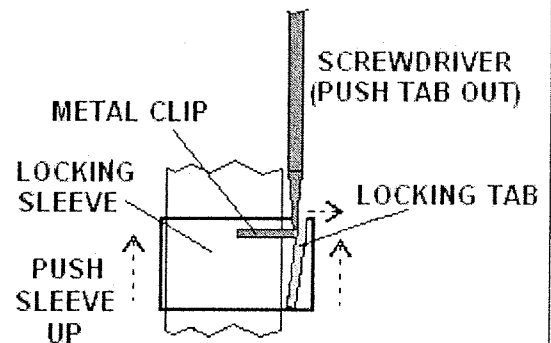
IMPORTANT! The Spring Lock restricts movement of the Arm Assembly and must not be removed until the Lamp Head is completely attached.

Step

1. Remove the Screw on the Locking Sleeve.



2. With a flathead screwdriver, push back the plastic Locking Tab inside the Locking Sleeve and push the Locking Sleeve upwards. The Sleeve cannot move unless the Tab is completely unlocked.

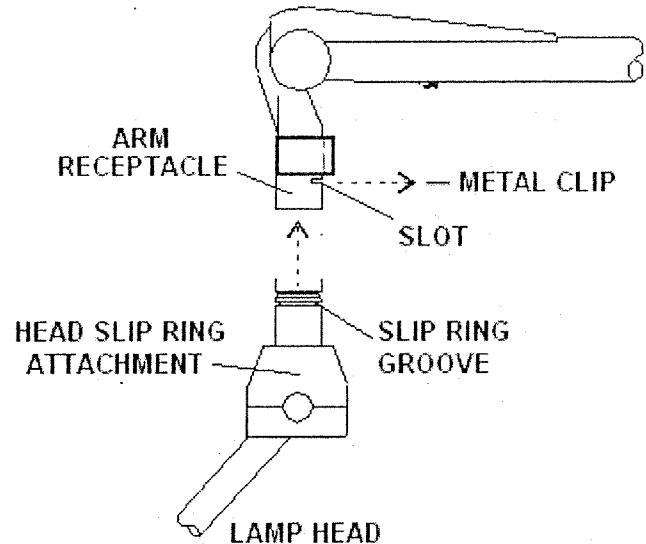


SECTION 2: INSTALLATION AND ASSEMBLY

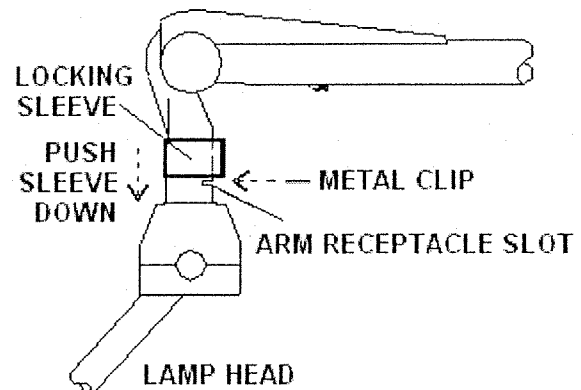
LAMP HEAD TO ARM ASSEMBLY - continued

Step

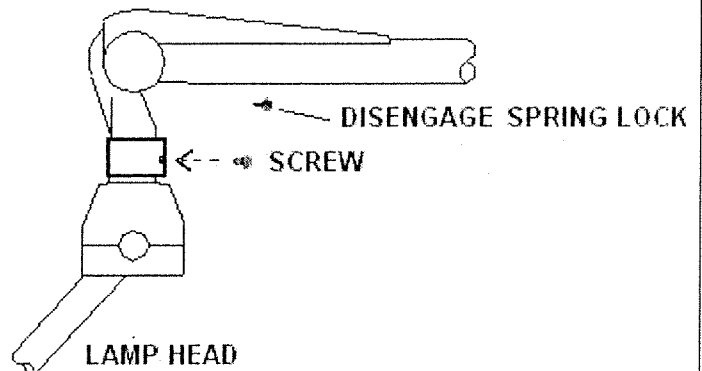
3. Extract the Metal Clip that is now exposed on the Arm Receptacle using a Needle Nose Pliers.
4. Remove the plastic cap from the Head Slip Ring Attachment.
5. Push the Head Slip Ring Attachment into the Arm Receptacle. Align the Groove that is cut around the Head Slip Ring Attachment so it can be seen through the Arm Receptacle slot.



6. Lock the Lamp Head and Arm Assembly by re-inserting the Metal Clip into the Arm Receptacle slot.
7. Push the Locking Sleeve downward until the plastic Tab locks (clicks).



8. Re-install the Locking Sleeve Screw.
9. Disengage the Spring Lock by removing its screw.
10. Energize Mains and verify operation.

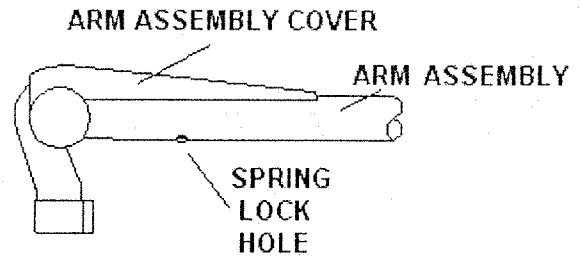


SECTION 3: ADJUSTMENTS AND MAINTENANCE

ARM ASSEMBLY ADJUSTMENT

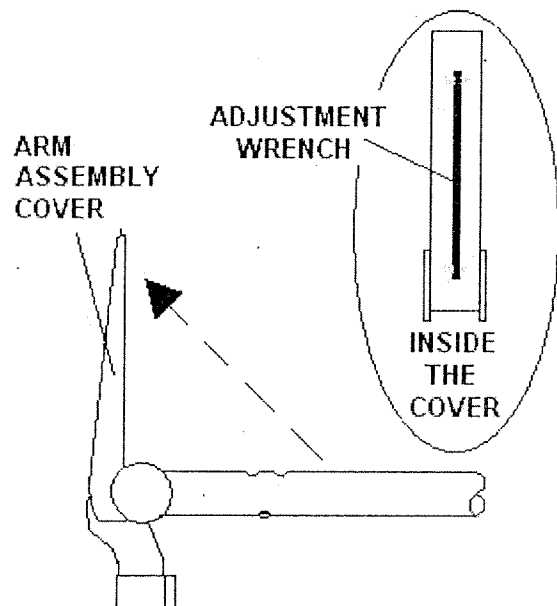
The Arm Assembly was pre-adjusted at our factory. If the Arm doesn't hold the Lamp Head (it drops) or if the tension is too strong, then adjustments are necessary.

Important: Adjustments can only be made when a Lamp Head Assembly is attached and the Spring Lock is disengaged (reference Step 9, Page 25).



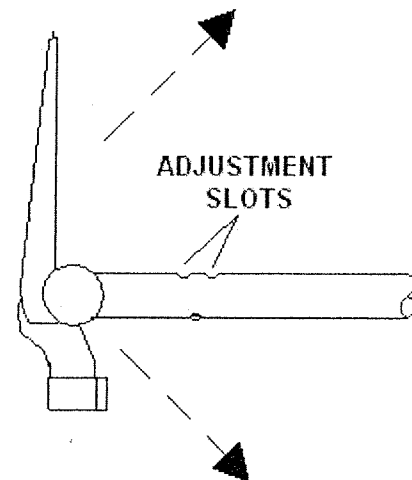
Step

1. Push back the Cover on the Arm Assembly and lift up. Inside the Cover, you will find an Adjustment Wrench.



2. There are two Adjustment Slots that allow you to view some of the Arm's internal assembly.

Slowly move the Arm Assembly vertically until the Adjustment Nut appears in one of the two slots. The Nut has small slots (holes) that fit the Adjustment Wrench. Note: The Adjustment Nut is not the fixed white plastic insert that can be seen inside one of the holes.



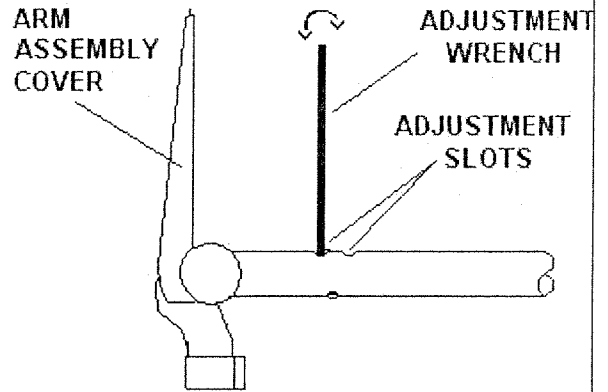
SECTION 3: ADJUSTMENTS AND MAINTENANCE

ARM ASSEMBLY ADJUSTMENT (continued)

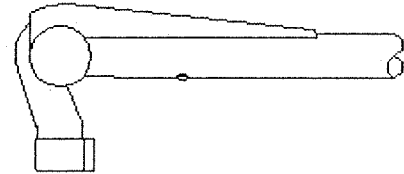
Step

3. Using the Adjustment Wrench, turn the Adjustment Nut in the appropriate direction of the arrow to increase or decrease the arm tension:
- If Arm drops too easily, then turn towards "+"
 - If Arm rises too easily, then turn towards "-"

As you turn the Nut, test the tension of the Assembly Arm. **Do not over-tighten.**



4. When complete, replace the Adjustment Wrench and Cover to original positions.

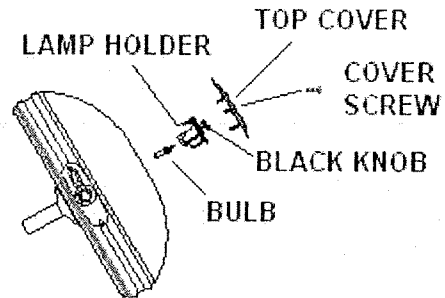


SECTION 3: ADJUSTMENTS AND MAINTENANCE

BULB REPLACEMENT

Shor-Line Dome Light

1. Turn the power off at the switch on the Lamp Head and allow bulb to cool for approximately 30 minutes.
2. Remove the screw and lift off the Top Cover.
3. Remove the Lamp Holder by pulling the Black Knob straight upward.



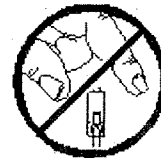
4. Using a clean dry cloth to handle the bulb, carefully pull the bulb from the Lamp Holder.
5. Insert new bulb into the Lamp Holder and reverse the above steps.

Important: Never touch existing or replacement light bulbs. Oils from your skin will damage the bulb. Handle with a cloth.

Do Not Substitute. Only replace with specified bulbs.



RIGHT



WRONG

Shor-Line Spot Light

1. Turn the power off at the switch on the Lamp Head and allow bulb to cool for approximately 30 minutes.
2. Remove the two screws and washers. Remove the End Bezel.
3. Pull the Fan and Lamp Holder Assembly straight outward (along the rails inside the barrel) and only far enough to gain access to the bulb.
4. Push the Release Level (on the Lamp Holder) forward and slide the old bulb outward. Return Release Level to original position.
5. Insert the new bulb into the Lamp Holder and reverse the above steps.

#8-32 SCREW
062.0806.00
#8 WASHER
065.0800.02

BULB
037.0023.00

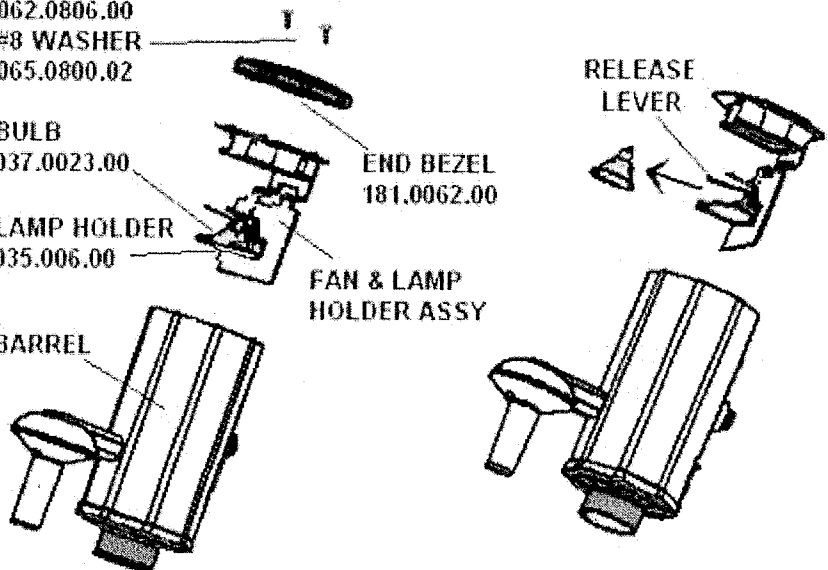
LAMP HOLDER
035.006.00

BARREL

END BEZEL
181.0062.00

FAN & LAMP
HOLDER ASSY

RELEASE
LEVER



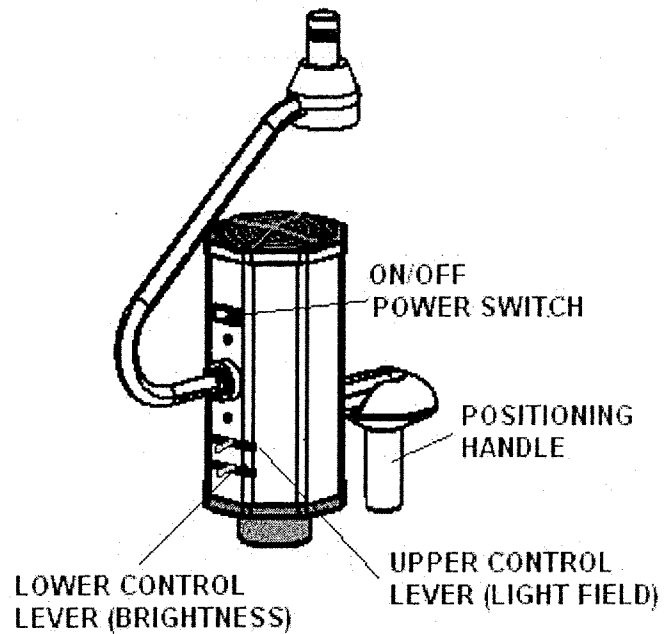
Do Not Substitute. Only replace with specified bulbs.

SECTION 4: SURGICAL LIGHTING SYSTEMS

FUNCTIONALITY

Shor-Line Surgical Spot Light:

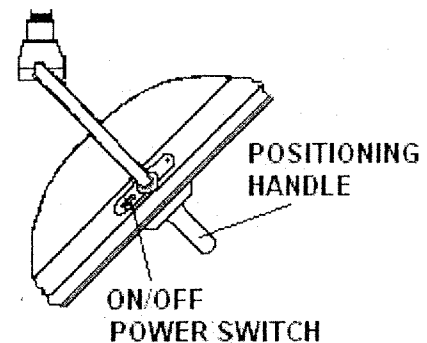
- Continuously adjustable spot from 3" to 11" diameter provides homogenous light with 4,150 foot candles at a distance of 36" and color temperature of approximately 4,000 degrees Kelvin.
 - The Upper Control Level adjusts the diameter of the light field (3" diameter minimum to 11" diameter maximum at a distance of 36 inches.)
- Mechanical dimmer provides constant purity of light without affecting color temperature.
 - The Lower Control Level adjusts the brightness of the light.
- Easily replaceable 150 Watt/21 Volt Halogen bulb.
- Heat absorbing glass filter
- Lamp Head rotates 360 degrees on a horizontal plane.
- Positioning handle mounted on perimeter allows for easy movement of Lamp Head.
- Autoclavable Positioning Handle – push quick connect release button to remove.
- International AC input range (88-132 VAC/176-264 VAC). 320 Watt switching power supply. Short circuit, overload, over-voltage, over-temp protected. Reset: Auto Recovery.
- AC current 1.42 amp.



SHOR-LINE SPOT LIGHT

Shor-Line Dome Light:

- Single 15" reflector provides a shadow-free beam at 4,000k.
- 6" diameter field of harmonious light and 4,000 foot candles at a normal 36" working distance.
- Autoclavable handle – push quick connect release button to remove.
- Independent, On-Off switch for each lamp head.



SHOR-LINE DOME LIGHT

SECTION 4: SURGICAL LIGHTING SYSTEMS

TECHNICAL INFORMATION

Component Weights

Head Assembly, Dome Light.....	9.47 lb (4.296 Kgm)
Head Assembly, Spot Light.....	8.5 lb (3.8 Kgm)
Arm, Ceiling or Wall Mounted Assembly.....	13.0 lb (5.9 Kgm)
Arm, Mobile Assembly.....	8.4 lb (3.8 Kgm)
Mount Assembly, Ceiling Single.....	28.0 lb (12.7 Kgm)
Mount Assembly, Ceiling Dual.....	43.0 lb (19.5 Kgm)
Mount Assembly, Wall	17.0 lb (7.7 Kgm)
Mount Assembly, Mobile	108.0 lb (49.0 Kgm)

Assembly Weights

Dual Head Ceiling System.....	85.4 lb (38.8 Kgm)
Single Head Ceiling System.....	49.2 lb (22.3 Kgm)
Wall Mount System.....	38.2 lb (17.3 Kgm)
Mobile System.....	124.6 lb (56.6 Kgm)

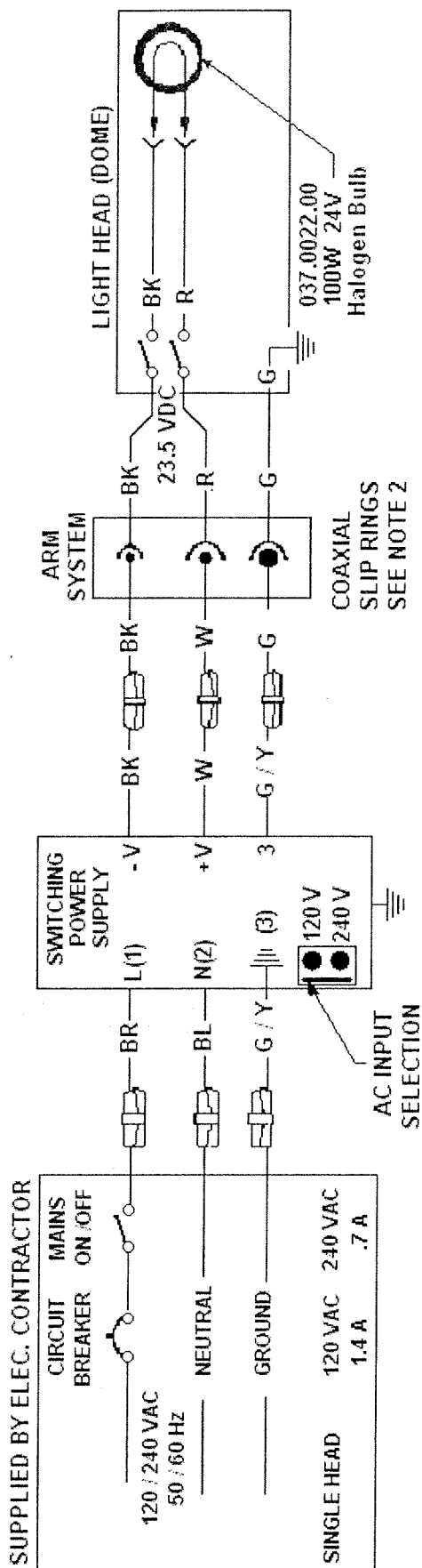
Electrical

Input Voltage/Current.....	120 VAC ~ 50/60Hz, 1.0A per head 240 VAC ~ 50/60Hz, 0.5A per head
Luminous Intensity, Dome Light	4000 foot candles per head at 36" (914mm)
Luminous Intensity, Spot Light	4150 foot candles per head at 36" (914mm)
Light Pattern, Dome Light	6.5inches (165mm) diameter
Light Pattern, Spot Light.....	Adjustable from 3" to 11" at 36" Adjustable from 76 mm to 279 mm at 36"

Motion-Extension

Head Vertical Motion.....	47 inches (1194 mm.)
Head Horizontal Motion.....	360°
Single Head Extended From Mounting Axis.....	70 inches (1778 mm.)
Dual Head Extended Length (Head to Head).....	144 inches (3658 mm.)
Dual Head Extended Length (Head to Head).....	38.5 inches (978 mm.)

SECTION 4: SURGICAL LIGHTING SYSTEM
 WIRING SCHEMATICS - WALL MOUNTED DOME LIGHT
 MODEL #913.5005.03



NOTES:

- 1) Wall mount units use two (2) slip rings.
- 2) Ridged arms and heads incorporate male coaxial slip rings.
- 3) Flex section of arms incorporate male coaxial slip rings.
- 4) Color code / abbreviations:

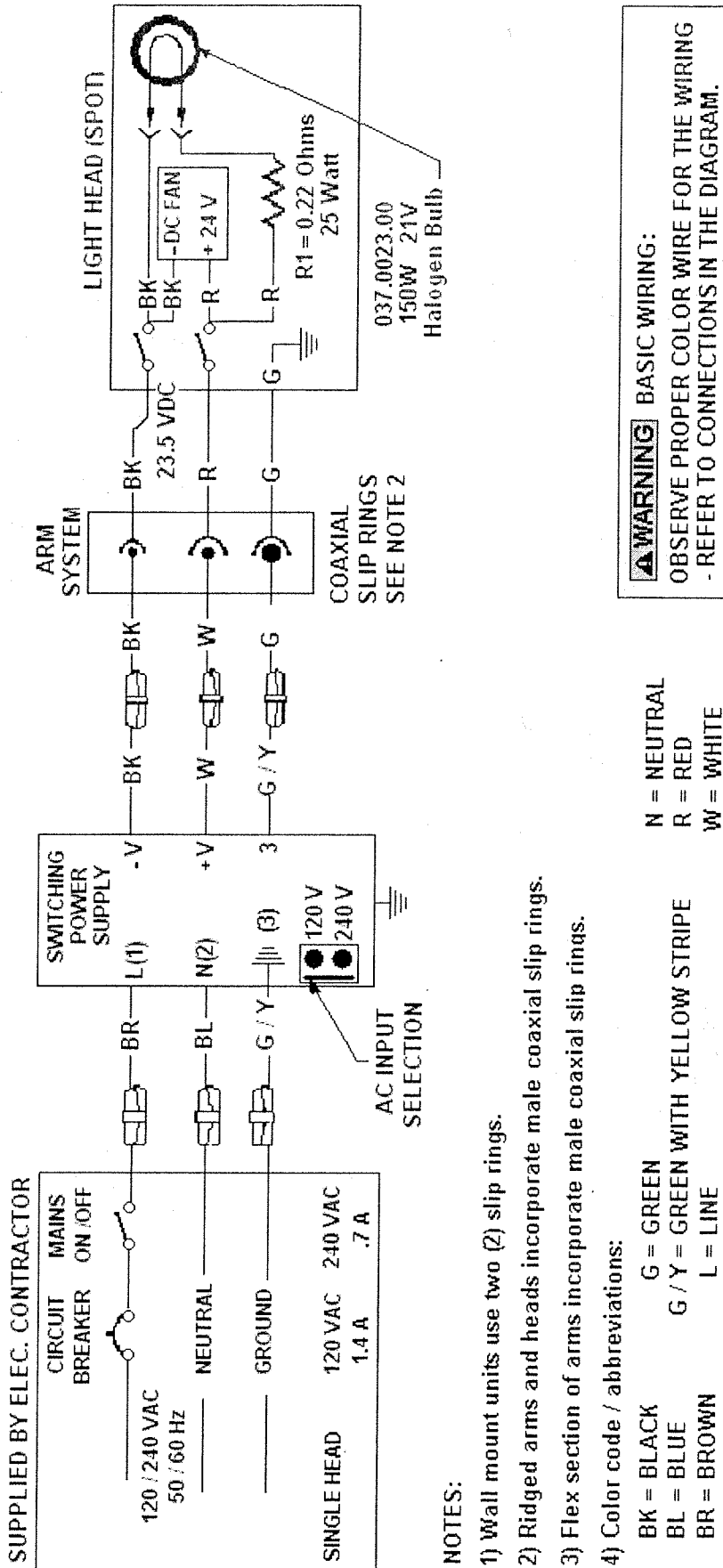
BK = BLACK
 BL = BLUE
 BR = BROWN

G = GREEN
 G / Y = GREEN WITH YELLOW STRIPE
 L = LINE

N = NEUTRAL
 R = RED
 W = WHITE

WARNING BASIC WIRING:
 OBSERVE PROPER COLOR WIRE FOR THE WIRING
 - REFER TO CONNECTIONS IN THE DIAGRAM.

SECTION 4: SURGICAL LIGHTING SYSTEM
WIRING SCHEMATICS - WALL MOUNTED SPOT LIGHT
MODEL #913.5006.03



120V DOME LIGHT, MODEL #913.5005.04
240V DOME LIGHT, MODEL #913.5005.14
120V SPOT LIGHT, MODEL #913.5006.04
240V SPOT LIGHT, MODEL #913.5006.14



- 1) Mobile units use two (2) slip rings.
- 2) Ridged arms and heads incorporate male coaxial slip rings.
- 3) Flex section of arms incorporate male coaxial slip rings.

4) Color code / abbreviations:

BK = BLACK

BR = BROWN

G = GREEN

G / Y = GREEN WITH
YELLOW STRIPE

L = LINE

N = NEUTRAL

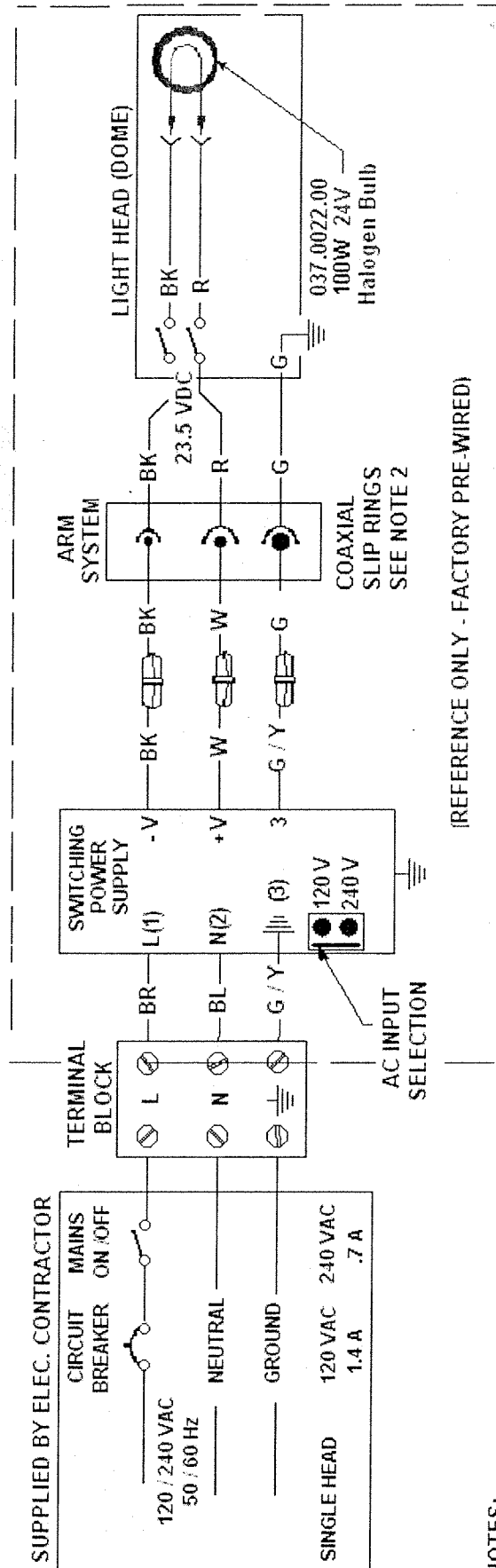
W = WHITE

(REFERENCE ONLY - FACTORY PRE-WIRED)

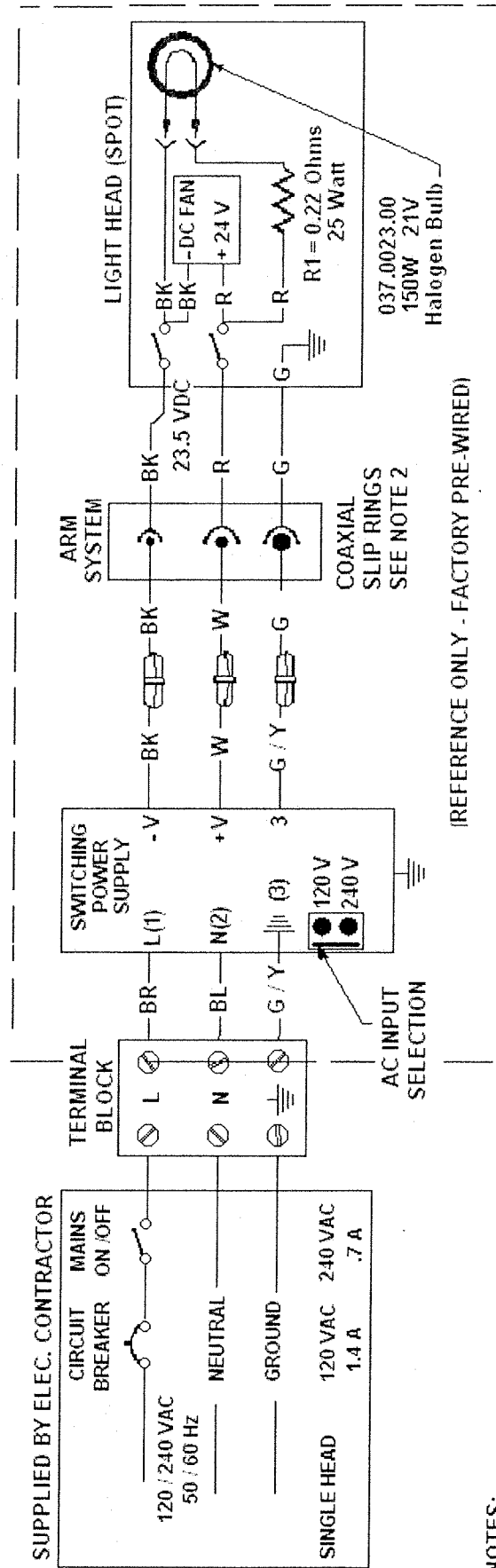
⚠ WARNING BASIC WIRING:

OBSERVE PROPER COLOR WIRE FOR THE WIRING
- REFER TO CONNECTIONS IN THE DIAGRAM.

SECTION 4: SURGICAL LIGHTING SYSTEM
 WIRING SCHEMATICS - CEILING MOUNTED SINGLE DOME LIGHT
 MODEL #913.5005.01



SECTION 4: SURGICAL LIGHTING SYSTEM
 WIRING SCHEMATICS - CEILING MOUNTED SINGLE SPOT LIGHT
 MODEL #913.5006.01



NOTES:

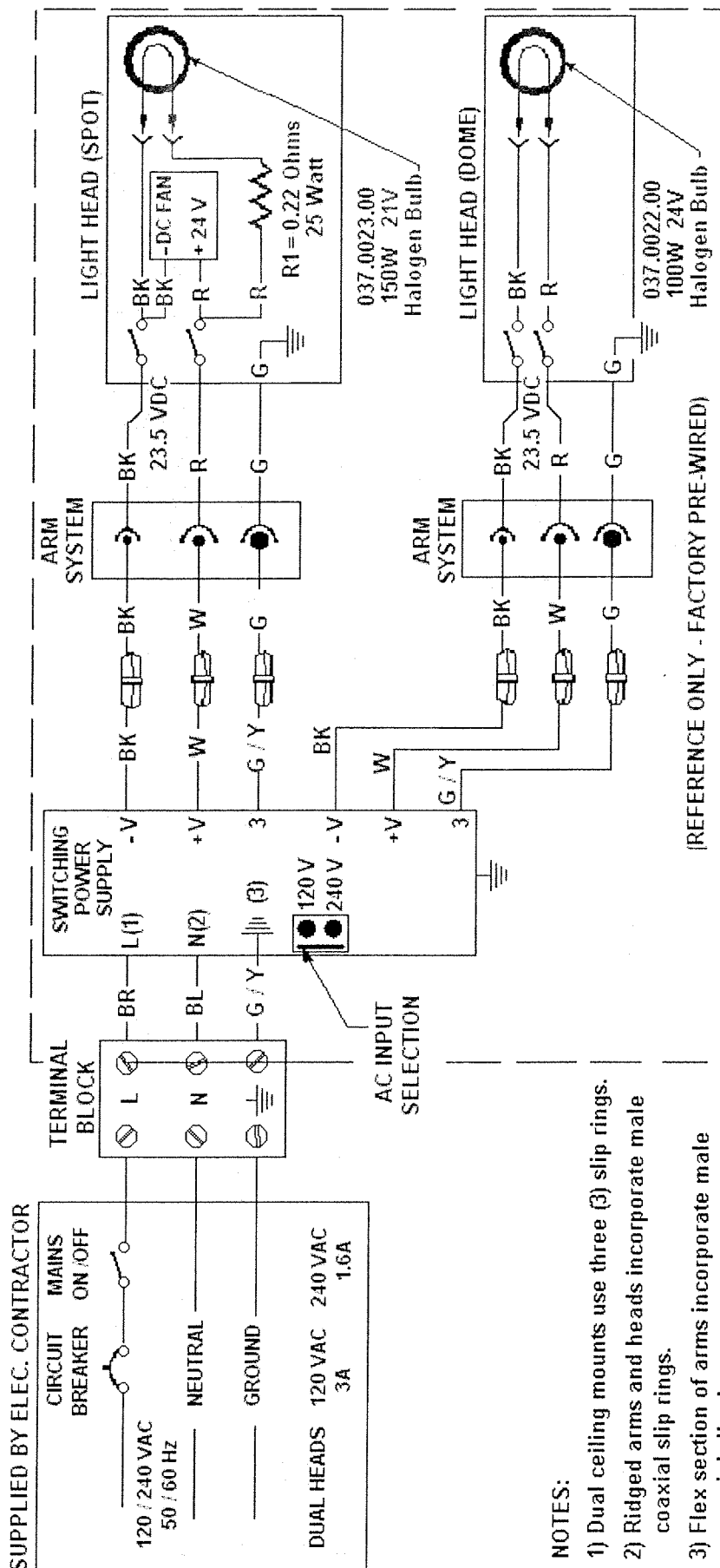
- 1) Single ceiling mounts use three (3) slip rings.
- 2) Ridged arms and heads incorporate male coaxial slip rings.
- 3) Flex section of arms incorporate male coaxial slip rings.
- 4) Color code / abbreviations:

BK = BLACK BR = BROWN G / Y = GREEN WITH YELLOW STRIPE
 BL = BLUE G = GREEN R = RED W = WHITE

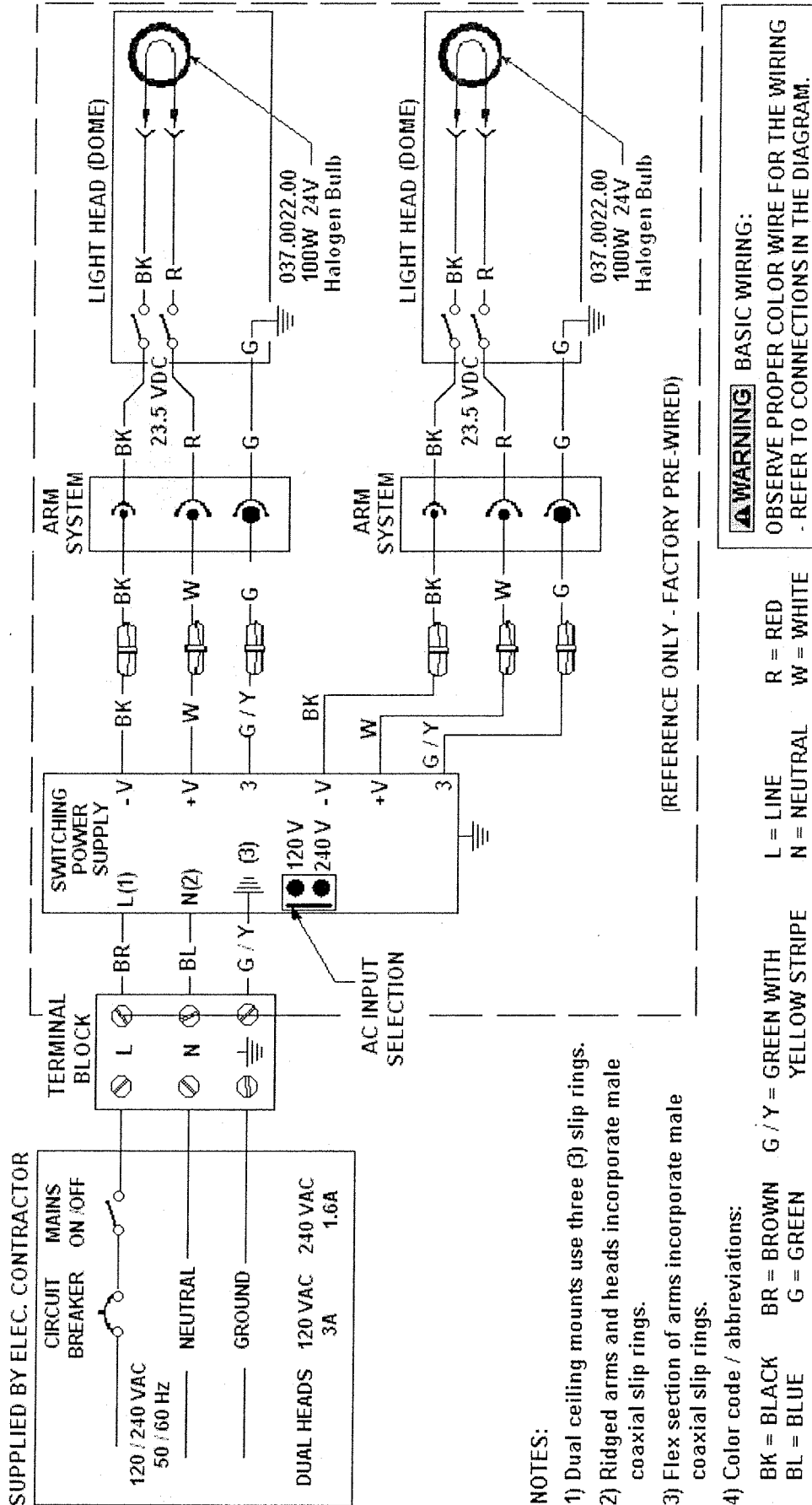
WARNING BASIC WIRING:

OBSERVE PROPER COLOR WIRE FOR THE WIRING
 - REFER TO CONNECTIONS IN THE DIAGRAM.

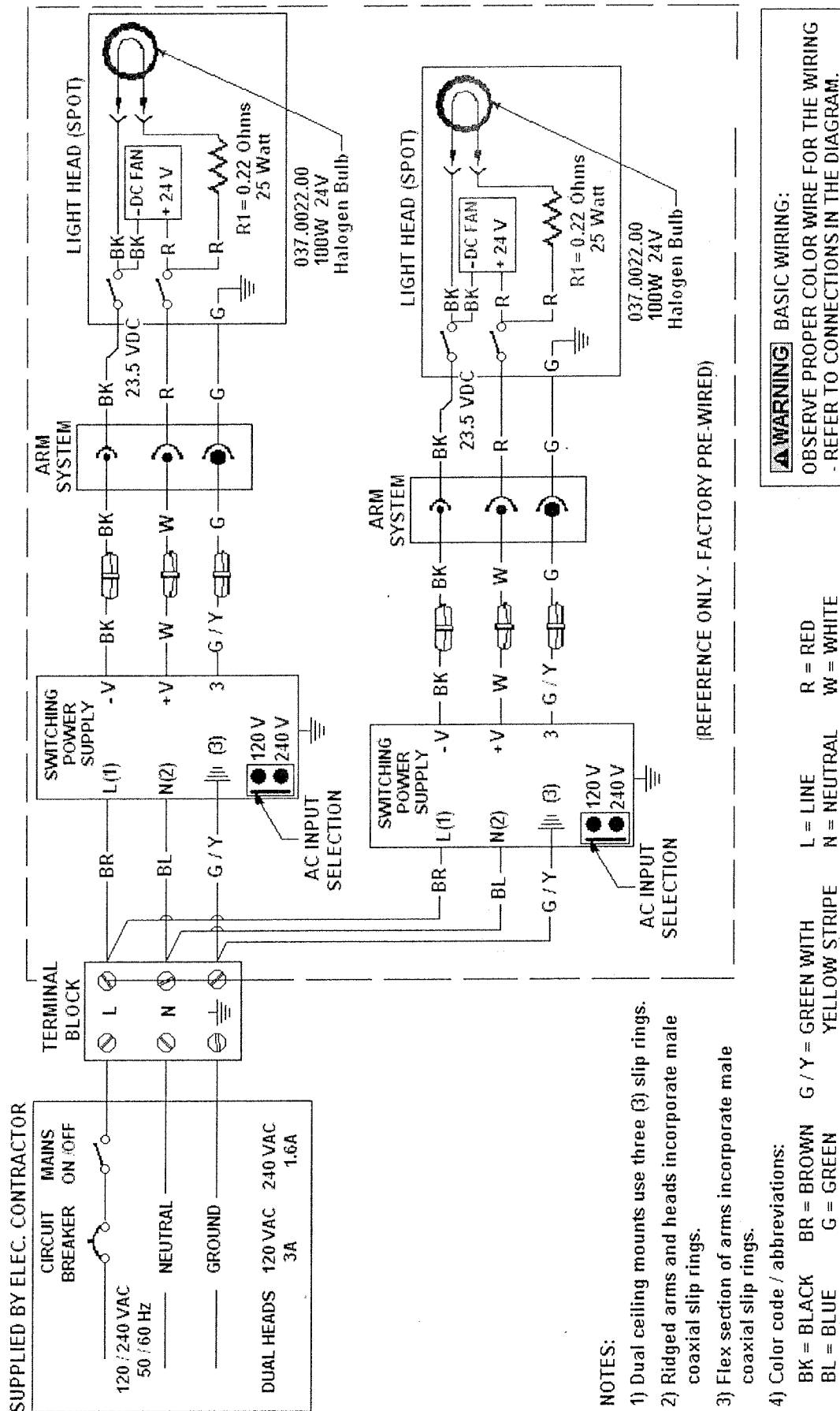
SECTION 4: SURGICAL LIGHTING SYSTEM



SECTION 4: SURGICAL LIGHTING SYSTEM
WIRING SCHEMATIC - CEILING MOUNTED DUAL DOME LIGHTS
MODEL #913.5005.02



SECTION 4: SURGICAL LIGHTING SYSTEM
WIRING SCHEMATIC - CEILING MOUNTED DUAL SPOT LIGHTS
MODEL #913.5006.05



SECTION 4: SURGICAL LIGHTING SYSTEMS

REPLACEMENT PARTS

LIGHT HEAD, DOME LIGHT

Part Number	Description
713.5005.14	Light Head Assembly Complete
037.0022.00	Light Bulb, 100 W/24V
012.2003.00	Glass, Filter
031.0015.00	Switch, ON-OFF
181.5005.00	Handle-Light, Quick- Connect

LIGHT HEAD, SPOT LIGHT

Part Number	Description
713.5006.01	Light Head Assembly Complete
037.0023.00	Light Bulb, 150 W/21V
012.2004.00	Glass, Filter
031.0015.00	Switch, ON-OFF
181.5005.00	Handle-Light, Quick- Connect

ARMS

Part Number	Description
176.0003.01	Arm For Dual Light Installation
176.0003.00	Arm For Single Light Installation
176.0003.02	Arm For Wall Mount Installation
176.0003.03	Arm For Mobile Light

MECHANICAL

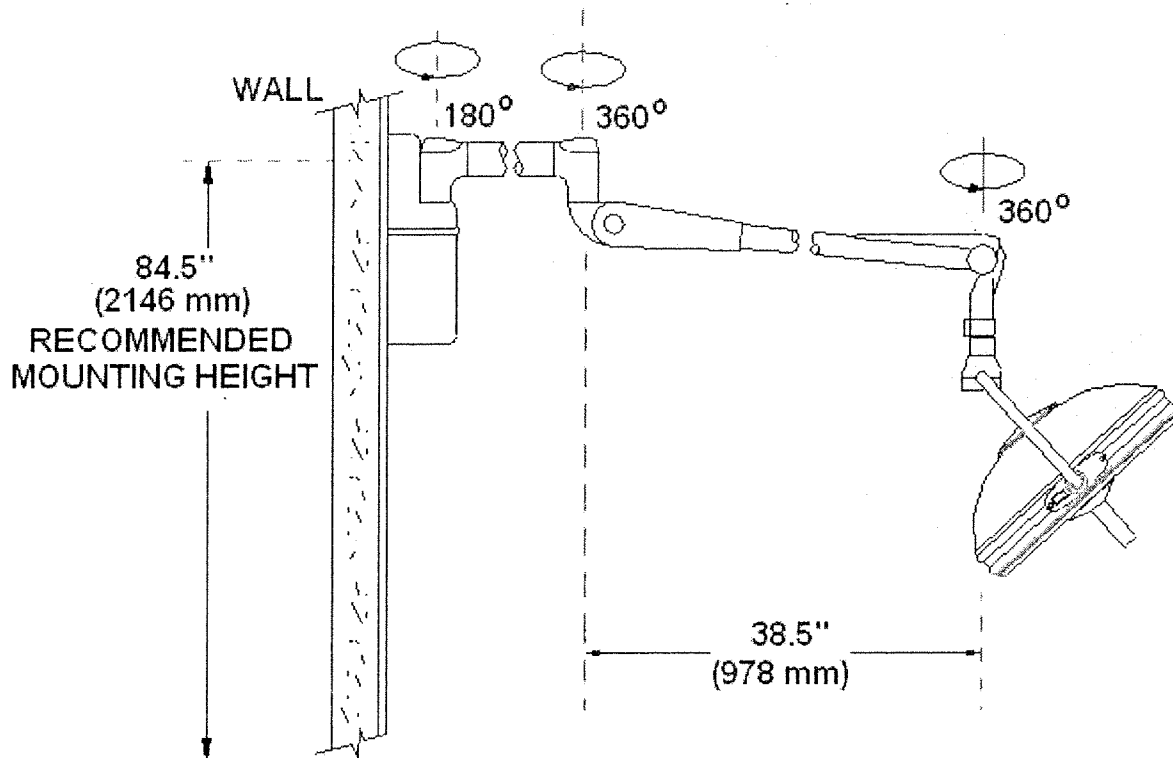
Part Number	Description
175.0000.00	Ceiling Mount (Column) Single Arm / Light Head
175.0000.01	Ceiling Mount (Column) Dual Arm / Light Head
181.0009.00	Ceiling Decorative Cover
181.0010.00	Wall Mount Decorative Cover (Upper And Lower)
060.1425.00	Wood Screw #14 X 2-1/2 (Mount Ceiling Or Wall Mount)
065.2500.00	Flat Washer 1/4 Inch (Wall Mount Mounting)
064.1000.56	Decorative Nut For Ceiling Cover (2 Req.)
065.1000.00	Flat Washer #10 For Ceiling Cover (2 Req.)
181.1012.00	Decorative Cover-Mobile Light
086.3000.11	Caster, 3 Inch Diameter With Brake-Mobile Light

ELECTRICAL

Part Number	Description
160.0202.01	Ring Terminal 14-16AWG #10 Stud
160.0501.00	Splice Connector 14-20AWG
160.0101.00	Quick-Connect, Female (Used To Connect On Power Supply)
039.1000.00	Module, Power Inlet With Switch- Mobile Light
027.1803.03	Power Cord, IEC-230 Hospital Grade
175.0000.07	Slip Ring-Male—Mobile Light
036.0005.00	Fuse-0.5A—250V—Type 3AG—Slo-Blo
036.0100.02	Fuse-1.0A—250V---Type 3AG—Slo-Blo

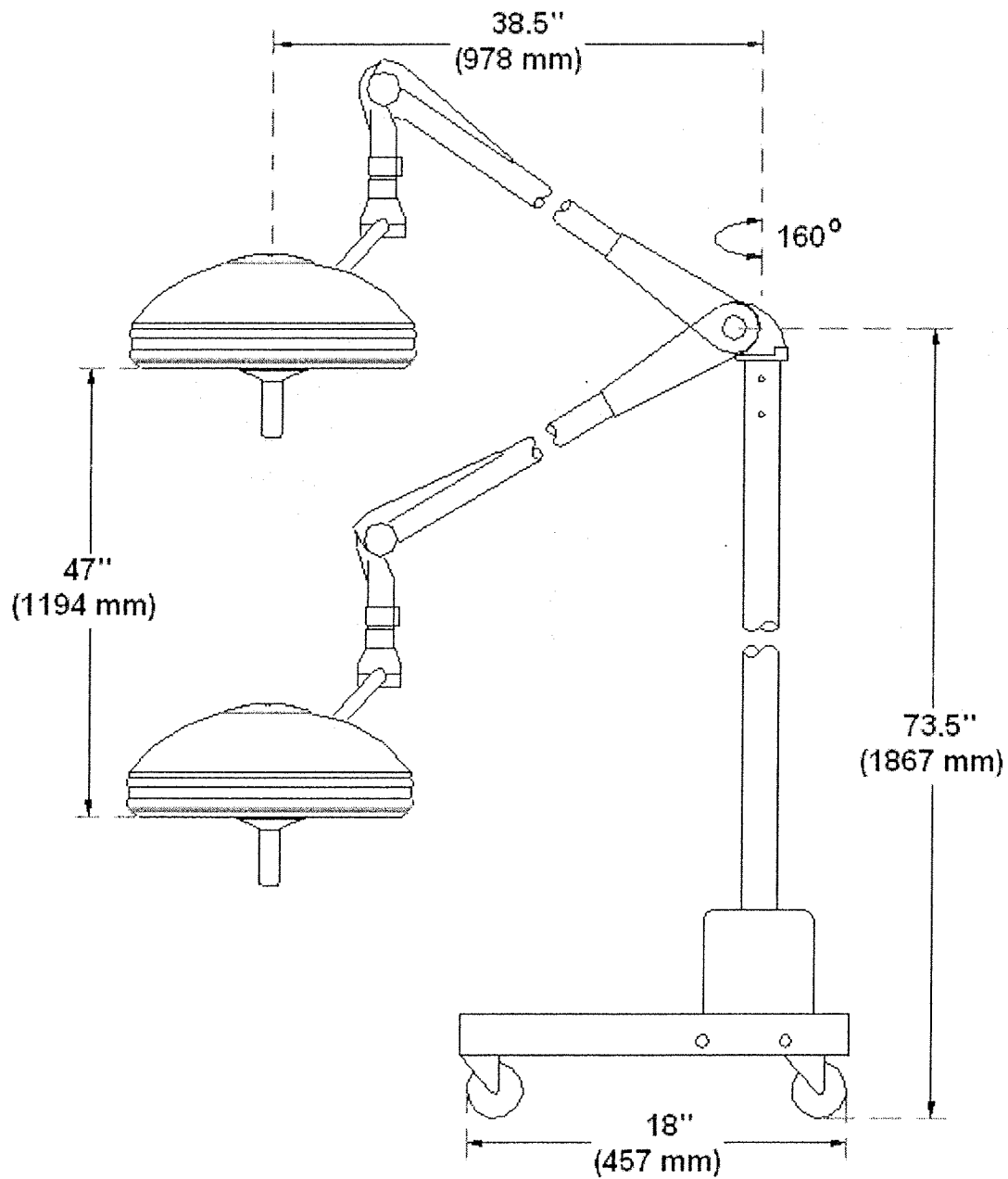
SECTION 4: SURGICAL LIGHTING SYSTEMS – DIAGRAM

WALL MOUNTED LIGHT SYSTEM

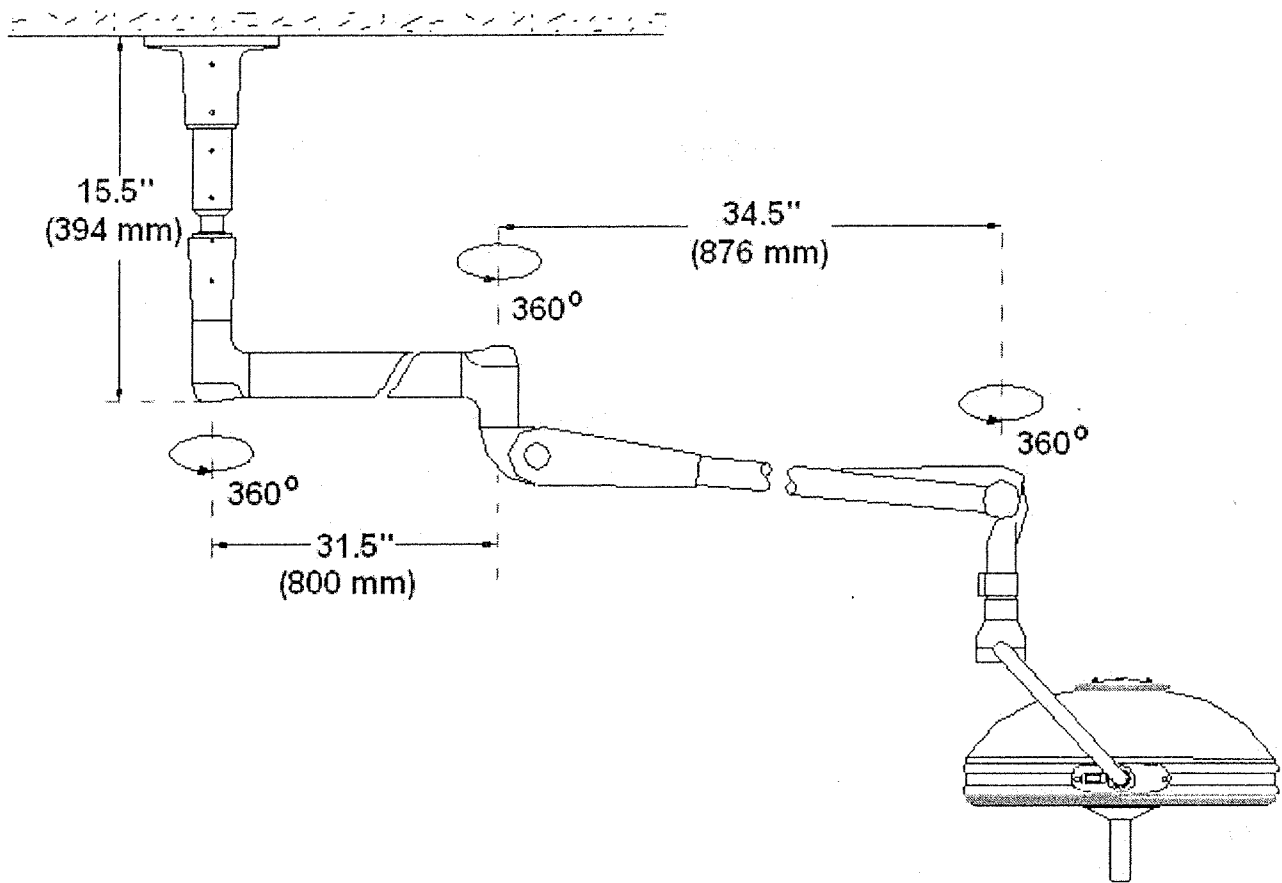


SECTION 4: SURGICAL LIGHTING SYSTEMS – DIAGRAM

MOBILE LIGHT SYSTEM

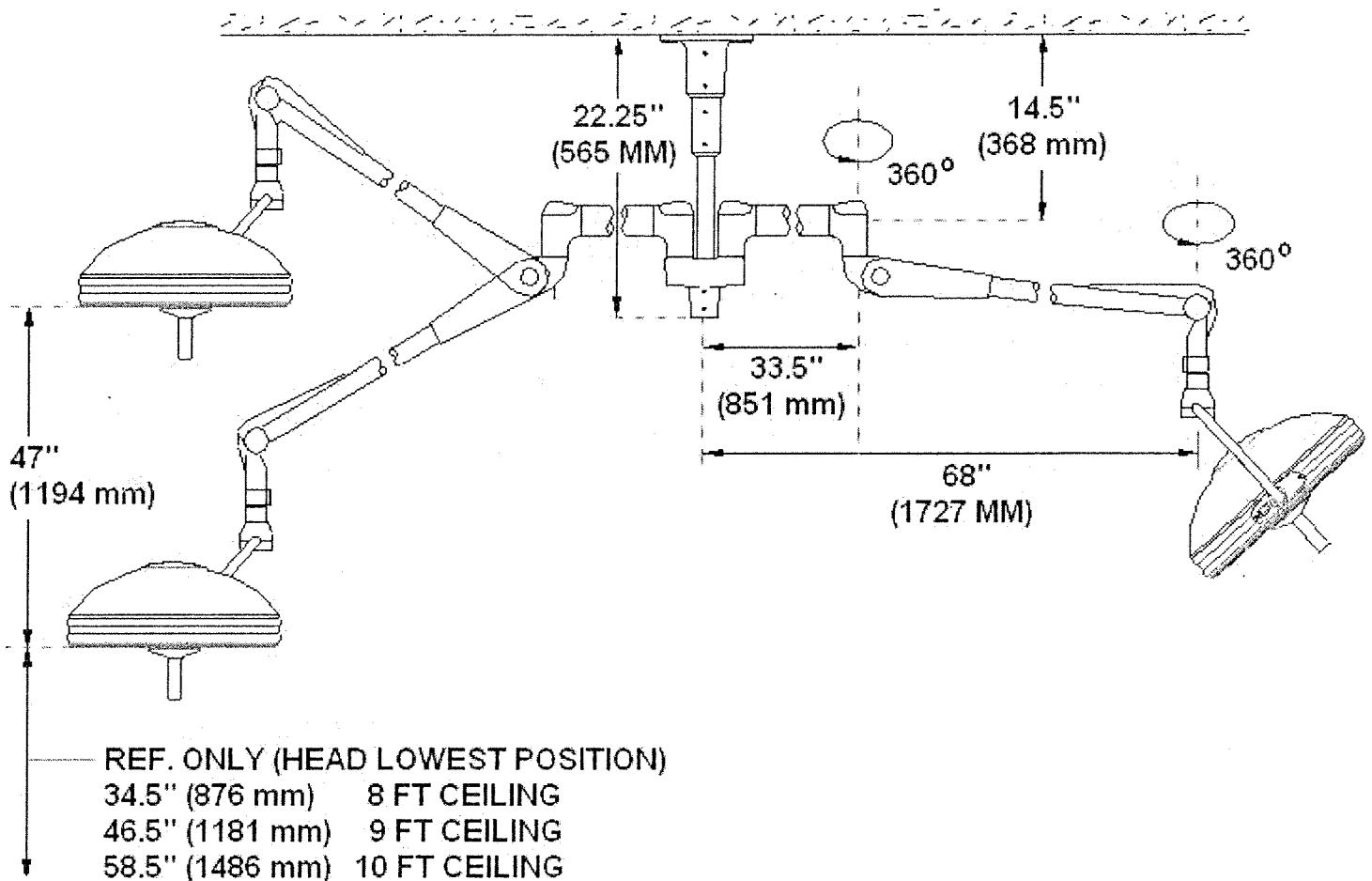


SECTION 4: SURGICAL LIGHTING SYSTEMS – DIAGRAM
CEILING MOUNTED SYSTEM - SINGLE HEAD ASSEMBLY



SECTION 4: SURGICAL LIGHTING SYSTEMS – DIAGRAM

CEILING MOUNTED SYSTEM - DUAL HEAD ASSEMBLY



SECTION 5: SHOR-LINE CUSTOMER INFORMATION

I. FREIGHT CLAIM & PRODUCT RECOVERY POLICY

Shor-Line does not abandon our commitment to customer satisfaction when products are in transition to your office.

If merchandise is received damaged, defective, or shorted and:

- A Shor-Line freight carrier is responsible, we'll replace or fix the merchandise to your satisfaction and manage the freight claim process.
- You chose an alternative carrier, we'll gladly provide support and guidance but you are responsible for product repair or replacement, as well as, managing cost recovery efforts.

To recover product(s) and cost, a claimant must prove that freight was damaged or short when delivered at your receiving area. To improve the quality of claims, we offer best practices in RECEIVING AND INSPECTING SHIPMENTS.

At a minimum, if problems exist with your shipment:

- Describe the damage or shortage on delivery receipt.
- Do not move damaged merchandise, its container, or its inner packing material from the location you discovered damage or shortage.
- Do not use damaged merchandise (if using, then stop).
- Call Shor-Line's Technical Service Department immediately.

Important:

- After fifteen (15) calendar days of receipt of merchandise, this policy becomes void.
- Failure to apply our instructions described in RECEIVING AND INSPECTING SHIPMENTS may result in you owning damaged products.

II. CUSTOMER SATISFACTION POLICY

If you are not fully satisfied with our product or your purchase decision, Shor-Line will replace the product or credit your account (excluding shipping and handling costs). We do require you:

- Within fifteen (15) calendar days of receipt of the product, to notify our Technical Service Department.
- To express in writing why you are not fully satisfied.
- Within thirty (30) calendar days, to return our product to Shor-Line in satisfactory condition and in compliance with our PRODUCT RETURN POLICY.

Important:

- This policy **does not apply to** specially designed, discontinued, used, factory second, or repaired products.
- After fifteen (15) calendar days of receipt of our product, this policy becomes void. Check our LIMITED WARRANTY if product quality lessens over time.
- Shor-Line's obligation is limited to providing the applicable credit, which will be processed only after the receipt of the returned product.

III. PRODUCT RETURN POLICY

There are several reasons why products are returned to Shor-Line, namely repairs, replacements, and credit.

1. It is our policy to only pay freight for:
 - IN-WARRANTY SERVICE (if product repair or replacement is justified).
 - Replacement of product is requested pursuant to: CUSTOMER SATISFACTION POLICY (Note: not applicable if credit is requested).

Important:

- Shor-Line will only pay for standard surface/ground shipping. A customer must pay for overnight delivery or other special requirements to expedite delivery.
- 2. If merchandise is damaged during transit AND a Shor-Line freight carrier was responsible, it is our policy to invoice our carrier for subsequent shipping costs.

If customer selected an alternative freight carrier who was responsible, Shor-Line will not be responsible for any costs related to product return or subsequent shipping.

Refer to RECEIVING AND INSPECTING SHIPMENTS for terms, conditions, and procedures.

Please notify us of any return prior to shipping and obtain an RMA (next page).

3. The customer is responsible to pay freight for all other types of returns (out-of-warranty service, return for credit, etc.).
- Please **notify us** of any return prior to shipping and obtain an RMA (next page).
- We recommend that you insure the shipment.

Regardless of circumstances or carrier, Shor-Line is not responsible for damages during in-bound shipment.

- If your return / repair shipment is received in damaged condition or shorted, we will notify you immediately. You will need to notify the carrier and initiate a claim inspection. Shor-Line will provide assistance, as necessary, to support your claim.
- 4. All products returned for credit or returned without being replaced or repaired are subject to a minimum 15% restocking charge.
- 5. Products are to be returned only to the address provided on RMA form (next page).

Contact SHOR-LINE at (800)444-1579 or (913)281-1500

SECTION 5: SHOR-LINE CUSTOMER INFORMATION

Important: All Returns Require an RMA Number

Products being returned for any reason or delivered for repair must receive advance authorization from our Technical Service Department. Before shipping, obtain a Return Merchandise Authorization (RMA) number to ensure efficient processing of your repair, replacement, or credit.

- RMA numbers should appear on the outside of the container in BOLD print.
- Only the precise product and quantity specified on the original RMA request should be returned with the RMA number issued.
 - If you intend to return additional products to us, a new RMA number should be required.

Failure to obtain a valid RMA or follow these instructions may delay the processing of your repair, replacement, or credit.

IV. PRODUCT REPAIR POLICY

There are several reasons why products require repair, namely normal wear-and-tear, excessive use, abnormal conditions, accidents, abuse, and inferior quality or workmanship.

1. Refer to LIMITED WARRANTY (paragraph two specifically) to understand in-warranty and out-of-warranty terms and conditions relating to repairs.
2. Refer to PRODUCT RETURN POLICY if a product needs to be shipped to Shor-Line.

IV. PRODUCT REPAIR POLICY - continued

3. If merchandise is damaged during shipping but can be repaired to your full satisfaction AND a Shor-Line freight carrier was responsible, it is our policy to expedite repairs, manage the freight claim, and invoice our carrier for costs associated with repair and subsequent shipping.

If a customer selected an alternative freight carrier, Shor-Line will not be responsible for any costs related to repair.

Refer to RECEIVING AND INSPECTING SHIPMENTS for terms, conditions, and procedures.

4. Any replacement parts furnished at no cost to the Customer, in fulfillment of the Shor-Line Limited Warranty, are warranted only for the unexpired portion of the original warranty.
5. Any services or repairs outside the scope of our Limited Warranty shall be at Shor-Line's rates and terms then in effect.

Important:

- All repairs, regardless if in-warranty or out-of-warranty, need to be initiated and authorized through our Technical Service Department. Failure may result in a customer being obligated for unauthorized expenses.

If shipping is required, Shor-Lines needs to issue you an RMA (prior column) to ensure repairs are managed properly and expeditiously.

SECTION 5: SHOR-LINE CUSTOMER INFORMATION

V. RECEIVING AND INSPECTING SHIPMENTS

INTRODUCTION

When preparing for transport, Shor-Line and a carrier inspected product quality and count. Because problems occur during transit, Shor-Line offers you best practices for receiving, inspecting, and unpacking your merchandise.

Please help us file claims and protect yourself by applying the following practices. **Failure to concur can result in you owning damaged products.**

Important:

- After fifteen (15) calendar days of receipt of merchandise, Shor-Line's FREIGHT CLAIM & PRODUCT RECOVERY POLICY becomes void.

A) AT TIME OF DELIVERY

1. **VERIFY COUNT** - Check the number of pieces (shipping containers, cartons, etc.) received against the number listed on carrier's delivery receipt (i.e. Bill of Lading).

If no discrepancy:

- Continue to: 2. INSPECT CONTAINERS FOR DAMAGE

If discrepancy (shortage):

- Write the number of pieces not delivered AND number of pieces delivered on all copies of delivery receipt.
- Confirm the shortage by having driver sign all copies of the delivery receipt. Retain a copy to file a claim for loss.
- Initiate carrier inspection and recovery processes:
 - If Shor-Line's carrier delivered freight, call our Shor-Line Technical Services Department immediately and we'll replace missing freight.
 - If customer-selected carrier delivered freight, contact carrier and initiate inspection and claim processes.
- Continue.

2. **INSPECT CONTAINERS FOR DAMAGE** - Thoroughly examine each shipping container for visible damage.

If **no visible damage** (containers are not crushed, torn, wet, or otherwise damaged):

- Accept the shipment, retain copy of delivery receipt, and continue to next page: B) AFTER ACCEPTANCE OF FREIGHT

If **minor visible damage**:

- Describe damage to container(s) in detail AND write "subject to damages discovered" on all copies of delivery receipt. This is critical for freight claims.
- Confirm your notation by having driver sign all copies of the delivery receipt.
- Accept the shipment, retain copy of delivery receipt, and continue to next page: B) AFTER ACCEPTANCE OF FREIGHT

2. **INSPECT CONTAINERS FOR DAMAGE** - continued

If **severe visible damage**:

- Write the number of containers damaged and describe damage to container(s) on all copies of delivery receipt.
- **Ask driver to inspect merchandise with you** and open container immediately. If driver will not inspect freight and leaves premise,
 - Write "Driver will not inspect merchandise" AND "Subject to concealed damage" on all copies of delivery receipt.
 - Have the driver sign to confirm your notation and keep a copy of the delivery receipt to file a claim.
 - Continue to next page: B) AFTER ACCEPTANCE OF FREIGHT
- Describe, in detail, all visible damage to merchandise on all copies of delivery receipt.
- Write "Subject to damages discovered" on all copies of delivery receipt and sign.
- Have the driver sign to confirm your notation on all copies of delivery receipt.
- Keep a copy of the delivery receipt to file a claim.
- Initiate carrier inspection and recovery processes:

If **Shor-Line's carrier delivered freight**:

- Call our Shor-Line Technical Services Department immediately and we'll replace or fix product to your satisfaction. Our team will coordinate product return and/or repair pursuant to our PRODUCT RETURN POLICY and PRODUCT REPAIR POLICY.
- We'll request documentation from you, coordinate future site inspection with carrier, and prepare you for site inspection. Reference next page: C) SUPPORT DURING SITE INSPECTION.

If **customer-selected carrier delivered freight**:

- Decide if you want to accept or reject the entire shipment. You may have the option to accept and reject parts of the shipment. Speak with carrier.*
- Write the number of pieces you accept AND number of pieces you reject on all copies of delivery receipt.
- Contact carrier and initiate inspection and claim processes.
- Continue to next page.

- * If the carrier abandons the merchandise (fails or refuses to return shipment), consult your legal counsel regarding disposition.

V. RECEIVING AND INSPECTING SHIPMENTS - continued

B) AFTER ACCEPTANCE OF FREIGHT

1. **INSPECT MERCHANDISE** - At the receiving area open (unpack, uncrate, etc.) all containers, as soon as possible, to ensure your expectations are met and to safeguard all rights to a freight claim. Inspect shipment for:

- Concealed Damage – Damage to merchandise that could not have been noted during delivery.
- Concealed Shortages – Loss of contents within a shipping container that could not have been noted during delivery.
- Non-compliance with order specifications

If concealed damage or shortage discovered:

- Do not use. Keep damaged merchandise, container(s), and inner packing materials at the receiving area.
- Keep damaged or shorted merchandise in its original shipping container and in same condition when damage or loss was discovered, until site inspection is completed.
- Move containers as little as possible.
- Initiate carrier inspection and recovery processes:

If Shor-Line's carrier delivered freight:

- Call our Shor-Line Technical Services Department immediately and we'll replace or fix product to your satisfaction. Our team will coordinate product return and/or repair pursuant to our PRODUCT RETURN POLICY and PRODUCT REPAIR POLICY.
- We'll request documentation from you within fifteen (15) calendar days of freight acceptance.
- We'll coordinate future site inspection with carrier and prepare you for site inspection. Reference next column: C) SUPPORT DURING SITE INSPECTION.

If customer-selected carrier delivered freight:

- Contact carrier to describe damage or loss immediately. Although not mandatory, confirm calls in writing, specifically noting the date, time and person to whom you spoke. Use documentation, if necessary, as evidence that you contacted the carrier within the 15 day period.
- Provide requested documentation and schedule inspection at your site. Reference next column: C) SUPPORT DURING SITE INSPECTION.

Important:

- To recover product(s) and cost, a claimant must prove damage or shortage existed at time of acceptance. Therefore, moving freight prior to inspection or delaying inspection too long can jeopardize claims.
- Often, a carrier cannot be held responsible unless inspections are completed within 48 hours. At the latest, shipping damage or shortage must be reported within 15 days of freight acceptance. NOTE: Fifteen (15) calendar days after freight acceptance, Shor-Line's FREIGHT CLAIM & PRODUCT RECOVERY POLICY becomes void.
- Perform this inspection even if merchandise won't be used right away.

C) SUPPORT DURING SITE INSPECTION

1. A third-party freight inspector will inspect freight containers, merchandise, and inner packing materials.

- Be present for the inspection and accompany the inspector at all times he/she is on your premises.
- Provide copy of delivery receipt as evidence that shortage, damage, and/or possible damage was noted at delivery.
- When inspection has been completed, read the inspector's report carefully and sign if you agree with the summary of facts or conclusions. **Do not sign** if you disagree:

If Shor-Line is handling claim process:

- Call our Shor-Line Technical Services Department and we'll speak with inspector.

If you are handling claim process:

- Consult your legal counsel regarding disposition.
- An inspection report is not a claim.
 - Stop if Shor-Line is handling claim process.
 - Continue if you are handling claim process.

D). AFTER INSPECTION

A freight claim is a written demand for a specific or determinable amount of money for merchandise damaged or lost during transit. The claim is written to the carrier and contains sufficient information delivered within the time limits specified in the delivery contract. To make a successful freight claim, you must prove:

- Carrier received freight in good condition at Shor-Line
- Freight was damaged or short when delivered
- The dollar amount of damage or shortage

1. If you are handling claim process:

Understand filing requirements and file claim within timeframe. To make a successful freight claim, you must prove:

- Carrier received freight in good condition at Shor-Line
- Freight was damaged or short when delivered
- The dollar amount of damage or shortage
- Retain damaged merchandise until the claim is completely resolved or until you are given disposition from the carrier. You cannot use or dispose of the merchandise without permission from the carrier.
 - Do not return merchandise to Shor-Line unless carrier grants permission AND we provide written authorization (RMA). Reference: PRODUCT RETURN POLICY. Failure to keep damaged freight voids any freight claim.
 - If carrier wants to take damaged merchandise, obtain a receipt from the driver at time of pick-up and file with other documentation.
- After carrier has rendered a decision, make sure remedy is completely satisfactory.
 - Unless you are absolutely certain that your damaged merchandise can be satisfactorily repaired, you should seek replacement.
 - If not satisfied, consult your legal counsel regarding disposition.

Important: You are still responsible to pay the freight bill on time. Your claim is a separate transaction.

SECTION 5: SHOR-LINE CUSTOMER INFORMATION

VI. LIMITED WARRANTY

Shor-Line warrants to the customer (CUSTOMER) who originally purchased the equipment (EQUIPMENT) that the EQUIPMENT be free from defects in material, workmanship, and manufacturer's defects for a period of 1 year from date of receipt of EQUIPMENT, warranty coverage on labor is 90 days. The above warranties cover all parts except expendable items such as bulbs and glass filters.

The warranty period shall run from the date of delivery to CUSTOMER. If within the applicable warranty period, a product proves to be defective as described herein, Shor-Line will repair or replace the product, at Shor-Line's sole discretion, conditional upon CUSTOMER's written notice of the defect within fifteen (15) days after its discovery. Upon receipt of CUSTOMER's notice, including substantiation of Customer's status as the initial purchaser and details of the defect, Shor-Line shall advise CUSTOMER whether it plans to repair or replace the product. Shor-Line's obligation is solely limited to repair or replacement of the defective product and in no event shall Shor-Line be liable for transportation from or to Shor-Line offices or any other expense which may arise in connection with this Limited Warranty or the aforementioned Customer Satisfaction Policy.

Shor-Line makes no other warranty or guarantee of any kind whatsoever, whether express or implied, statutory or otherwise, including but not limited to implied warranties of fitness and/or merchantability. The above limited warranty constitutes our only warranty and no person or entity is authorized, on behalf of Shor-Line, to modify or expand upon the provisions expressed in the limited warranty statement. Shor-Line's liability under the limited warranty shall be limited as provided for above and the foregoing shall be the customer's sole remedy and recourse under this contract. There are no warranties that extend beyond the description of the face hereof and goods are sold as is. Shor-Line Limited Warranty is only available to the initial purchaser of its products.

VI. LIMITED WARRANTY (continued)

Customer agrees to comply with all instructions and specifications furnished by Shor-Line relating to installation, care and application of products sold. It is required that the EQUIPMENT be installed by a licensed electrician. Failure to comply will result in a void of all warranties.

CUSTOMER agrees that it will not modify, misapply, or misuse such products in any manner that would deviate from Shor-Line's instructions. Any repairs, alterations or service provided by parties other than Shor-Line, or its authorized representative may void this Limited Warranty. This Limited Warranty shall not apply to normal wear and tear, damage caused by accident, negligence, or improper operation.

The Shor-Line's Limited Warranty, made in connection with this sale, shall not be effective and shall be void unless such goods are applied and used in accordance with Shor-Line's instructions.

LIMITATION OF LIABILITY

Under no circumstances shall Shor-Line be liable to buyer or any other person for any special, liquidated, incidental or consequential damages, including without limitation, damages based upon lost goodwill, lost sales or profits, work stoppage, delay, product failure, impairment of goods or otherwise and whether arising out of breach of warranty, breach of contract, negligence or otherwise, and in any case, Shor-Line's liability for any and all losses and damages sustained by Buyer and others rising out of or by reason of this contract, shall not exceed the original purchase price of the product upon which liability is founded.

In no event shall any action be commenced against Shor-Line more than one year after the cause of action with respect to which the claim is made has accrued. Shor-Line shall not be responsible for expenses for repairs not made by Shor-Line without the prior written consent of Shor-Line.

**SHOR-LINE CUSTOMER AND PRODUCT INFORMATION
SURGICAL LIGHTING SYSTEMS**

Thank you again for placing your trust in Shor-Line.

Contact Us:

SHOR-LINE

Schroer Manufacturing Company
511 Osage
Kansas City, Kansas 66105, USA
Phone: (800)444-1579 or (913)281-1500
Fax: (913)281-5339
Web: www.shor-line.com
E-Mail: contact@shor-line.com

SHOR-LINE LIMITED

Vale Business Park
Llandow
Cowbridge
Vale of Glamorgan
CF71 7PF
Wales, United Kingdom
Phone: +44(0) 1446 77 20 41
Fax: +44(0) 1446 77 36 68
Web: www.shor-line.co.uk
e-mail: quality@shor-line.co.uk



TO: Steven Graves

TOTAL PAGES: 4

E-mail: gravess@pondco.com

DATE: 6-5-15

FROM: Gary L. Bath

SUBJECT: Evaluation of equivalent material for
Resinous Flooring (section 096723)
Project: Clayton Cnty Animal Control Bldg
Bid Date: 6-26-15

Dear Mr. Graves:

Would you be willing to approve Key Epoxy Resinous Flooring Systems that are equivalent to the systems specified for the above referenced project? Three contractors bidding this project would prefer to use Key Resin materials if approved. If you use Masterspec, ARCOM has evaluated and approved Key Resin materials for inclusion in MASTER SPECS in section 9400, Epoxy Terrazzo, and in section 9671, Resinous Flooring. The Key equivalents for this project are listed below:

Stonclad GS w/Stonkote HT4 @ 1/4" = Key Mortar STD-HP w/#625 Epoxy @ 1/4"

Key Resin certifies that these products meet or exceed the specified requirements.

Effects of Proposed Equivalent Product

Is product represented locally? **Yes**

Supplier/Representative: Key Resin Co./ Gary Bath (770-535-8932)

Is the submitted product equivalent to the specified item? **Yes**

Does the submitted product comply with the same quality standards listed? (ASTM, etc.) **Yes**

Does the submitted product have the same dimensions(thickness) indicated on drawings? **Yes**

Does the submitted product affect work of other sections? **No**

Does the submitted product require modifications to design, changes to drawings, or revisions to specifications to be incorporated into the Project? **No**

Is construction time affected? **No**

Does the submitted product have the same appearance? **Yes**

Does the submitted product have similar color selections available? **Yes**

Does the submitted product conform to the specified performance required for this particular application? **Yes**

Is proposed product warranty equal to the specified warranty? **Yes**

Does proposed product manufacturer have a record of standing behind its product and warranty? **Yes**

The undersigned certifies the above statements to be correct.

Submitted by: Gary Bath/Key Resin Co. (770-535-8932)

Attachments (List): Key Mortar STD-HP

For use by (ARCHITECT/ENGINEER/DESIGNER)

Accepted:

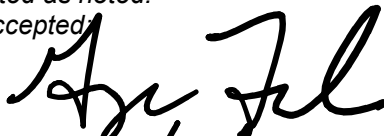
Accepted as noted:

Not Accepted:

By:

Date:

Remarks:


6/8/15

Published in Addendum No.:

Thank you for taking time to review this information, please call me if you have any questions. Key Resin Company appreciates the opportunity to be of service to you. I realize that your firm has not previously specified Key Resin materials. If you use Masterspec for your office specifications, ARCOM has evaluated and approved Key Resin materials for inclusion in MASTER SPECS in section 9400, Epoxy Terrazzo, and in section 9671, Resinous Flooring.

Sincerely,

Gary L. Bath
Manufacturer's Representative
Key Resin Company
770-535-8932

P.S. The approval section above may be emailed to gary@garybath.com



SUBSTITUTION REQUEST

Project: _____ Substitution Request Number: _____

To: _____ From: _____

Date: _____
A/E Project Number: _____
Re: _____ Contract For: _____

Specification Title: _____ Description: _____
Section: _____ Page: _____ Article/Paragraph: _____

Proposed Substitution: Plexi-Chemie Inc.

Manufacturer: Plexi-Chemie Inc. Address: 606-6 Lane Ave. N. Jacksonville, FL Phone: 904-693-8800

Trade Name: _____ Model No.: _____

Installer: _____ Address: _____ Phone: _____

History: ☐ New product ☐ 2-5 years old ☐ 5-10 years old ☒ More than 10 years old
We manufacture and install. Complete turnkey process. The proposed substitution
Differences between from Plexi-Chemie which is a DBE in FL and has high/stronger physical
proposed substitution characteristics. The resin to hardener loading is higher with our flooring
and specified product: systems - producing a much stronger floor that has a life expectancy of over
20 years. Our floors are resin rich. Our installers are employees of the company each with
over 10 yrs experience and they are involved with the project from the PO to the CO.
☒ Point-by-point comparative data attached - REQUIRED BY Fill in if required

Reason for not providing _____
specified item: _____

Similar Installation:
Project: _____ Architect: _____
Address: _____ Owner: _____
_____ Date Installed: _____

Proposed substitution affects other parts of Work: ☒ No ☐ Yes; explain _____

Savings to Owner for accepting substitution: 30% - 50% (\$ _____).

Proposed substitution changes Contract Time: ☐ No ☐ Yes [Add] [Deduct] _____ days.

Supporting Data Attached: ☐ Drawings ☒ Product Data ☐ Samples ☐ Tests ☐ Reports ☐ _____

SUBSTITUTION REQUEST (Continued)

The Undersigned certifies:

- Proposed substitution has been fully investigated and determined to be equal or superior in all respects to specified product.
- Same warranty will be furnished for proposed substitution as for specified product.
- Same maintenance service and source of replacement parts, as applicable, is available.
- Proposed substitution will have no adverse effect on other trades and will not affect or delay progress schedule.
- Cost data as stated above is complete. Claims for additional costs related to accepted substitution which may subsequently become apparent are to be waived.
- Proposed substitution does not affect dimensions and functional clearances.
- Payment will be made for changes to building design, including A/E design, detailing, and construction costs caused by the substitution.
- Coordination, installation, and changes in the Work as necessary for accepted substitution will be complete in all respects.

Submitted by: _____

Signed by: _____

Firm: _____

Address: _____

Telephone: _____

Attachments: _____

A/E's REVIEW AND ACTION

- ☒ Substitution approved - Make submittals in accordance with Specification Section 01330.
☐ Substitution approved as noted - Make submittals in accordance with Specification Section 01330.
☐ Substitution rejected - Use specified materials.
☐ Substitution Request received too late - Use specified materials.

Signed by: _____ Date: 6/8/15

Additional Comments: ☐ Contractor ☐ Subcontractor ☐ Supplier ☐ Manufacturer ☐ A/E ☐ _____



June 5, 2015

Amy Sue Mann
Hogan Construction Group
5075 Avalon Ridge Parkway
Norcross, Ga. 30071

Amy Sue,

I am writing to ask you to take a look at an alternate brand manufacturer for the resinous flooring scope of work for the Clayton County Animal Control project. The manufacturer is Plexi-Chemie, Inc. based out of Jacksonville, FL.

We are submitting for your review a fit, form and function equal to the specified Stonhard Flooring Systems. For **EF-1**, Stontec ERF, we are submitting Plexi-Chemie's **PlexiFlake QAF Decorative Seamless** resinous flooring system. For **EF-2**, StonClad GS with top coat Stontec HT4, we are submitting Plexi-Chemie's **PlexiClad GS** with top coat **PlexiGlaze IFF Seamless** resinous flooring system.

EF-1	
Product Specified	Equivalent
Stonhard Stontec ERF 2mm thick Resinous flooring System that is abrasion, impact, and chemical-resistant, aggregate filled, and a resin based monolithic floor surface designed to produce a seamless floor and integral cove base.	Plexi-Chemie PlexiFlake QAF 2mm thick Resinous flooring System that is abrasion, impact, and chemical-resistant, aggregate filled, and a resin based monolithic floor surface designed to produce a seamless floor and integral cove base.
Primer: <ul style="list-style-type: none"> • Material Basis: Stonhard Standard Primer • Resin: Epoxy • Formulation Description: (2) two component 100 per cent solids. • Application Method: Squeegee and roller. • Number of Coats: (1) one • Aggregates: Broadcast quartz into wet primer coat. 	Primer: <ul style="list-style-type: none"> • Material Basis: Plexi-Chemie Standard Primer • Resin: Epoxy • Formulation Description: (2) two component 100 per cent solids • Application Method: Squeegee and roller • Number of Coats: (1) one • Aggregates: Broadcast quartz into wet primer coat
Body Coats: <ul style="list-style-type: none"> • Material Basis: Stonshield Undercoat • Resin: Epoxy • Formulation Description: (3) three component solvent free epoxy. • Application Method: Notched Squeegee. <ol style="list-style-type: none"> 1. Thickness of Coats: 25-30 mils with standard primer coat. 2. Number of Coats: (1) One. 	Body Coats: <ul style="list-style-type: none"> • Material Basis: PlexiQuartz Undercoat • Resin: Epoxy • Formulation Description: (3) three component solvent free epoxy. • Application Method: Notched Squeegee. <ol style="list-style-type: none"> 1. Thickness of Coats: 25-30 mils with standard primer coat. 2. Number of Coats: (1) One.
Broadcast <ul style="list-style-type: none"> • Material Basis: Stontec Flakes • Formulation Description: Decorative Flake (1/16th " or 1/4 ") 	Broadcast <ul style="list-style-type: none"> • Material Basis: PlexiFlakes (Flakes) • Formulation Description: Decorative Flake (1/16th " or 1/4 ")



High Performance Seamless Resinous Flooring Systems

<ul style="list-style-type: none"> • Type: Tweed • Finish: Broadcast to rejection • Number of Coats: One 	<ul style="list-style-type: none"> • Type: Tweed • Finish: Broadcast to rejection • Number of Coats: One
<p>Topcoat:</p> <ul style="list-style-type: none"> • Material Basis: Stonshield Sealer • Resin: Epoxy • Formulation Description: (2) component, UV stable, solvent free epoxy. • Type: Clear • Finish: Gloss • Number of Coats: one 	<p>Topcoat:</p> <ul style="list-style-type: none"> • Material Basis: PlexiCrest XP Topcoat • Resin: Epoxy • Formulation Description: (2) component, UV stable, solvent free epoxy. • Type: Clear • Finish: Gloss • Number of Coats: one
(ASTM D-638) Tensile Strength = 5,200 psi	(ASTM D-638) Tensile Strength = 5,100 psi
(ASTM C579) Compressive Strength = 10,000 psi	(ASTM C579) Compressive Strength = 12,500 psi
(ASTM D-790) Flexural Modulus of Elasticity = 1.7×10^6 psi	(ASTM D-790) Flexible Strength = 4,800 psi
(ASTM D-2240) Hardness Shore D = 85-90	(ASTM D-2240) Hardness Shore D = >85
(ASTM D-4060) Abrasion Strength = 0.03 gm max	(ASTM D-4060) Abrasion Strength = 0.07 mg/loss
Manufacturer/Installer	Manufacturer/Installer

We are also submitting for your review a fit, form and function equal brand to the specified Stonhard StonClad GS with Stonkote HT4 Topcoat. We are submitting Plexi-Chemie's **PlexiClad GS** resinous flooring system with **PlexiGlaze Industrial Floor Finish Topcoat**.

EF-2	
Product Specified	Equivalent
<p>StonClad GS</p> <p>A 1/4 inch thick Resinous Flooring System that is abrasion, impact, chemical resistant, aggregate filled, resin based monolithic flooring surface designed to produce a seamless floor and integral cove base.</p>	<p>PlexiClad GS</p> <p>A 1/4 inch thick Resinous Flooring System that is abrasion, impact, chemical resistant, aggregate filled, resin based monolithic flooring surface designed to produce a seamless floor and integral cove base.</p>
<p>System Characteristics:</p> <ul style="list-style-type: none"> • Color and Pattern: As indicated on drawings • Wearing Surface: Standard Smooth • Integral Cove Base: As indicated on the drawings • Overall System Thickness: Nominal 1/4 inch 	<p>System Characteristics:</p> <ul style="list-style-type: none"> • Color and Pattern: As indicated on drawings • Wearing Surface: Standard Smooth • Integral Cove Base: As indicated on the drawings • Overall System Thickness: Nominal 1/4 inch
<p>Primer</p> <ul style="list-style-type: none"> • Material Basis: Stonhard Standard Primer • Resin: Bisphenol F, Epoxy • Formulation Description: (2) component, 100% solids • Application Method: Squeegee and Roller • Number of Coats: (1) One 	<p>Primer</p> <ul style="list-style-type: none"> • Material Basis: Plexi-Chemie Standard Primer • Resin: Bisphenol F, Epoxy • Formulation Description: (2) component, 100 per cent solids • Application Method: Squeegee and Roller • Number of Coats: (1) One



High Performance Seamless Resinous Flooring Systems

<p>Mortar Base</p> <ul style="list-style-type: none"> • Material Design Basis: StonClad GS • Resin: Bisphenol F Epoxy • Formulation Description: (3) three component, 100 % solids • Application Method: Metal Trowel <ul style="list-style-type: none"> 1. Thickness of Coats: Nominal ¼ inch (6.4 mm) 2. Number of Coats: One • Aggregates: Pigmented Blended aggregate. 	<p>Mortar Base</p> <ul style="list-style-type: none"> • Material Design Basis: PlexiClad GS • Resin: Bisphenol F Epoxy • Formulation Description: (3) three component, 100 % solids • Application Method: Metal Trowel <ul style="list-style-type: none"> 1. Thickness of Coats: Nominal ¼ inch (6.4 mm) 2. Number of Coats: One • Aggregates: Pigmented Blended aggregate.
<p>Top Coat</p> <ul style="list-style-type: none"> • Material Design Basis: Stonkote HT4 • Resin: Bisphenol F, Epoxy • Formulation Description: (2) component, 100% solids • Type: Pigmented • Finish: Standard • Number of Coats: One 	<p>Top Coat</p> <ul style="list-style-type: none"> • Material Design Basis: PlexiGlaze IFF • Resin: Bisphenol F, Epoxy • Formulation Description: (2) component, 100% solids • Type: Pigmented • Finish: Standard • Number of Coats: One
<p>(ASTM C579) Compressive Strength = 10,000 psi</p>	<p>(ASTM C579) Compressive Strength = 12,500 psi</p>
<p>(ASTM C-307) Tensile Strength = 1,750 psi</p>	<p>(ASTM C-307) Tensile Strength = 2,200 psi</p>
<p>(ASTM C580) Flexural Strength = 4,000 psi</p>	<p>(ASTM C580) Flexural Strength = 4,300 psi</p>
<p>(ASTM D2240 / Shore D) Hardness = 85-90</p>	<p>(ASTM D2240 / Shore D) Hardness = 80-90</p>
<p>(ASTM D4541) Bond Strength = >400 psi, 100% concrete failure</p>	<p>(ASTM D4541) Bond Strength = >400 psi, 100% concrete failure</p>
<p>(ASTM D4226) Impact Resistance = 160 in lbs.</p>	<p>MIL-D-3134 Impact Resistance = No chipping, cracking or delaminating: not more than 1/16 inch permanent indentation</p>
<p>(ASTM D4060) Abrasion Resistance = 0.1 gm max weight loss</p>	<p>(ASTM D4060) Abrasion Resistance = < 0.1 gm loss max</p>
<p>(ASTM C580) Flexural Modulus of Elasticity = 2.0×10^6</p>	<p>(ASTM C580) Flexural Modulus of Elasticity 0.29%</p>
<p>(ASTM D-635) Flammability = Self-Extinguishing</p>	<p>(ASTM D-635) Flammability = Self-Extinguishing</p>

Please review the attached data sheets. Visit our web-site at www.plexi-chemie.com.

Plexi-Chemie, Inc. is a manufacturer of high-performance seamless flooring systems for the restoration and protection of concrete surfaces. Our product line includes epoxy, urethane, heavy duty resurfacers, self-levelers as well as state of the art UV protective coatings, waterproofing systems and high chemical resistant materials. We offer 24/7 customer service to our installers.

The certified installer for the southeast is Industrial Flooring Specialists. They have 25 years experience installing seamless epoxy flooring. They are also a state certified minority owned business (JSEB, WMBE, and DBE).



High Performance Seamless Resinous Flooring Systems

We hope we have the chance to come in as an alternate. Thank you in advance for any help you can be to us.

Sincerely,
Joanne Grant
President-Plexi-Chemie, Inc.



Product Data Sheet For:

PLEXIFLAKES QAF

Description

PLEXIFLAKES QAF SEAMLESS RESINOUS FLOORING is a nominal 1/8 inch decorative, "poured in place" flooring system comprised of 1/4 or 1/8th inch decorative flakes, colored quartz aggregate incorporated into PlexiGlaze No.4 Clear or PlexiGlaze FLOOR FINISH (a 3-component epoxy). This system is typically top coated with PlexiCrest P (Polyester Urethane) or PlexiCrest XP (Polyaspartic) or PlexiCrest WBP or a two-component 100% solids UV resistant clear epoxy sealer. PlexiFlake QAF systems are best used for commercial applications. PlexiFlake QAF floors provide a terrazzo- like appearance with the benefits of a seamless floor. These floors require no waxing and are easily cleaned. Long term care of PlexiFlake QAF floors can be done with renewed additional topcoats. Surface finish can be smooth or slip resistant. Thicknesses can range from 1/16, 3/32, and 1/8th inch or greater.

Recommended Uses

- Schools
- Animal Facilities
- Laboratories
- Traffic Aisles
- Restrooms
- Lobbies
- Concourse
- Pharmaceutical and Food Processing
- Offices and Holding Areas
- Halls/ Corridors
- Retail Stores
- Clean rooms
- Healthcare

Benefits

- Easy installation
- Low odor
- Meets USDA, FDA, and OSHA standards
- Easy to use
- Good abrasion (wear) resistance
- Easy maintenance
- 2, 4, or 6 inch cove base available

Color

- PlexiFlake QAF is available in 1/4 or 1/8th inch decorative flakes. The 1/4 inch flakes are available in 10 standard blends. Color options include solid colors or custom multi-color pre-blends.

Limitations

- Can be installed up to 3/16 for areas requiring increased thickness.
- This product is best suited for application in temperatures between 55 and 95°F. Substrate must be cleaned, sound and dry.

Packaging

- Colored quartz aggregate: 50 lb. bags
- Base Coat: 1 gallon, 5 gallon or 55 gallon drums; 50 lb. boxes of SL filler
- Vinyl Flakes: 50 lb. boxes
- Sealer: 1 gal, 5 gal, 55 gal

Surface Preparation

- **PlexiFlake QAF** is ideally suitable for application over new or a clean, sound, profiled substrate. Not recommended over rehabilitated slab or wood, brick, tile, asphalt, mastic or products that are gypsum-based.
- This Product requires surface preparation in order to perform as expected. Substrate must be profiled clean sound and dry and free of all grease, oils, fats, loose or foreign materials, and laitance. The surface must show open pores throughout and have a sand paper texture.

Installation Procedures

The primer (**PlexiGlaze #4 Primer**) (**PlexiGlaze MVB 2000 Primer**) is mixed and then applied to the floor. The primer is allowed to cure. The base coat is mixed and applied at a nominal 15 mils. The base coat is then broadcasted to refusal with selected size quartz. Once cured sweep off excess and then apply grout coat **PlexiGlaze #4 resin**. Then broadcast to refusal the vinyl flake/chip. Make certain that coverage is uniform and complete. Once cured apply two coat of clear urethane or epoxy or equivalent.

DO NOT ATTEMPT TO INSTALL MATERIAL IF TEMPERATURES ARE NOT WITHIN 40° - 85°F.

PlexiFlake QAF Technical Information

Salt spray Resistance, 25%	No effect after 100 hrs
Toxicity	Non- toxic, USDA approved

Physical Property	Test Method	Result
Hardness, shore D	ASTMD-2240	60-70
Water Absorption	ASTMD-570	0.04%
Tensile strength	ASTMD-638	3,750 PSI
Flexural Strength	ASTMD-790	4,800 PSI
Compressive Strength	ASTMD-695	15,500 PSI
Bonds strength to Concrete	ACI-403	100% concrete failure
Impact Resistance	ASTM D-4226	>160 inch per lbs.
Cure Rate	77°F	12 Hours Foot / 24 Operational
Elevated temperature	MIL D-3134	No slip or flow
Thermal Shock, 50 cycles of immersion in chilled and boiling water	MIL F-52505	No cracking or loss of adhesion
UV resistance	MIL F 52505	No chalking or loss of adhesion
Abrasion resistance CS 17 wheel, wgt. Loss, 1000 gr. Load, 10000 cycles	ASTM D-4060	22 mg loss
Coefficient of Friction (dry)	ASTM F-1679	0.735
Coefficient of Friction (wet)	ASTM F-1679	0.625
Flammability	ASTM E-648	Class 1

Before using any Plexi-Chemie Inc. product, be sure the Material Safety Data Sheet is read and understood.



606-6 Lane Avenue North
Jacksonville, FL 32254
Phone (904) 693-8800 FAX (904) 693-8700
www.plexi-chemie.com

Product Data Sheet For:

PLEXICREST XP

Polyaspartic (Ester) Urethane Coating

DESCRIPTION

PLEXICREST XP Polyaspartic (Ester) Urethane, clear or pigmented, is a state of the art high solid, no VOC's (Volatile Organic Compound), aliphatic polyurea that was developed for UV stable (colorfast) polyurea flooring applications as a primer, body coat, grout coat, top coat or a standalone coating. PlexiCrest XP can also be installed as a clear topcoat over a quartz or flake broadcast system. This new generation polyurea displays fast cure times and excellent adhesion characteristics. PlexiCrest XP is designed to be quick gelling (15 minutes) in order to optimize leveling and wetting properties. This state of the art polyurea elastomeric displays excellent chemical resistance, water insensitivity, and UV resistance (in any color) at a wide range of temperatures. PlexiCrest XP will provide a glossy, smooth finish when fully cured. Aggregate can be broadcast into this self-leveling material to provide a non-skid surface. PlexiCrest XP emits virtually no odors and can be applied indoors with minimal disturbance contributed to high V.O.C. levels found in most epoxies and polyurethanes. This product meets USDA and FDA specifications. PlexiCrest XP can be applied at temperatures as low as minus -30° F and as high as 100° F. When cured, PlexiCrest XP can tolerate temperatures as high as 350° F.

FEATURES

VOC Compliant	Excellent UV Resistance
Fast Setting (within 20-30 minutes)	High Gloss/ Water Clear Finish
High Strength	Greater Abrasion/ Chemical/ Impact Resistance
Excellent Weatherability	Good Resiliency/ Can Be Pigmented
One Day Install Time	High Build Thickness in One Coat
Forms Excellent Bond	No out Gassing

AVAILABLE COLORS

- *Clear, Most primary colors (including white)
- *Custom tinting available

PACKAGING / COVERAGE

15 gallon kit: 2 five-gallon pails of Part A and 1 five gallon pail of Part B

TYPICAL PROCESSING PROPERTIES

Gel Time (75° F) Pot Life	15-20 minutes
Tack free time (75° F)	45 minutes
Open to foot traffic	60 minutes
Volume Ratio	2A:1B

STORAGE

Material containers should always be stored indoors in a minimum temperature range of 68°F – 85°F (20° C – 29°C). The product has a shelf life of 1 year from the date of manufacture.

MIXING

Part A and Part B should be mixed individually before combining. Add Part A to Part B while mixing, using a mechanical mixer (Jiffy Mixer) at medium speeds. Mix until a homogeneous mixture and color is obtained (at least 5 minutes). Use care to scrape the sides of the container to ensure that no unmixed material remains. Use caution not to whip too much air into the material as this may result in pinhole blisters or shortened pot life. Do not mix more material that can applied in 10-15 minutes. Otherwise, material will harden.

APPLICATION

PlexiCrest XP can be spread using a notched squeegee, brush or nap roller for the application. It should be noted that the thicker the application, the longer the curing process takes.

At 70°F (21°C) and 50% relative humidity, each coat needs to cure a minimum of 2-4 hours. Allow a minimum of 4 hours before permitting light pedestrian traffic and at least 24-48 hours before permitting heavy pedestrian or auto traffic onto the finished surface. Higher temperatures and/or high humidity will accelerate the cure time. Use caution in batch sizes and thickness of application. Low temperature and/or humidity extend the cure time.

EQUIPMENT CLEANUP

Equipment should be cleaned with an environmentally safe solvent, as permitted under local regulations, immediately after use.

TYPICAL PHYSICAL PROPERTIES

Solids Content		92% + 5% mixed
Tensile Strength, psi	ASTM D412	5000-8000
Hardness Shore D	ASTM D2240	70-75
Flexibility 1/8 th inch mandrel	ASTM D1737	Pass
Elongation	ASTM D412	30-50%
Viscosity, cp @ 75°	Mixed	350 EPS 400
Tear Strength	ASTM D624	350 pli
Taber Abrasion	ASTM D4060	22 mg
Gel Time	min @ 75°F	15-20
Initial Set Time	min @ 75°F	20-30
Mix Color	Clear	
Mix Ratio	2A:1B by volume	
Cure Time	1-2 hrs.	
VOC		30-40 g/L
Flammability		Self-extinguishing over concrete

This product contains isocyanate and curative material.

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606-6 Lane Avenue North
Jacksonville, FL 32254
Phone (904) 693-8800 FAX (904) 693-8700

Product Data Sheet For:

PLEXICLAD GS

DESCRIPTION

PlexiClad is a 100% solids, 3-component troweled pigmented epoxy resin and natural aggregate mortar flooring system. PlexiClad is installed at a thickness of 3/16th to a 1/4 inch. It is designed to rehabilitate worn concrete and as a protective overlayment on new concrete while offering superior protection from heavy industrial traffic (impact, abrasion and compaction). The surface texture can be modified to offer varying degrees of slip and chemical resistance in wet environments. PlexiClad can also incorporate an integral seamless sanitary cove base.

TYPICAL USES

In heavy-duty forklift traffic aisles, high abrasion and impact areas, wet processing areas, waste water treatment facilities, pulp and paper plants, food and beverage plants, dairies, machine shops, automotive manufacturing, chemical handling areas, loading docks, and as a superior resurfacer that's easy to install.

FEATURES

Seamless, minimal odor, resistant to most reagents, high impact resistance, high abrasion resistance, and variable surface textures. PlexiClad is available with Bio-inhibitor antimicrobial. This treatment will provide the floor with long-term protection against a broad spectrum of bacterial and fungal attack. It is formulated into the flooring system from the basecoat up through the topcoat.

Formulation

Part A (resin), Part B (activator), Part C (color), Part D (graded silica sand).

Durability

PlexiClad is highly durable and performs extremely well in areas requiring high impact and abrasion resistance. PlexiClad is formulated to handle various degrees of chemical and thermal shock resistance. PlexiClad offers unrivaled compressive, tensile and flexural strength with excellent abrasion resistance and hardness. It resists the most severe chemicals and adheres firmly without odor when applied to concrete that has received proper surface preparation. Additional chemical resistance is achieved by using PlexiCoat F Novalac Resin.

Appearance

PlexiClad is available in standard colors, may be broadcast with quartz, and sealed with a variety of sealers. Likewise, the surface may be left smooth, without quartz broadcast, and top coated with epoxy or urethane resins.

Coverage

Approximately 24 – 28 square feet per single unit at 1/4".

Surface Preparation

All concrete substrates and other surfaces to receive PlexiChemie's seamless resinous flooring systems require surface preparation. The substrate must be clean, durable, structurally sound, dry and free of grease, wax, oil or other substrate contaminants. PROPER SURFACE PREPARATION IS CRITICAL IN THE SUCCESSFUL PLACEMENT OF ALL RESINOUS

FLOORING SYSTEMS. Surface preparation requires that the following factors be reviewed and acted upon:

- Decontamination
- Removal & replacement of non-durable concrete
- Repair of surface irregularities
- Creation of the proper surface profile for a mechanical bond

Surface preparation should be done in accordance with ACI 503 Recommendations, ASTM Standard Practice for Surface Cleaning Concrete for Coating and ASTM Standard Practice for Abrading Concrete ASTM D 4259. PlexiChemie does not recommend acid etching as a form of surface preparation because it introduces both water and acid to the substrate. Surface preparation should be done by mechanical means only. Preferred method of mechanical preparation is shot blasting and scarification. Use diamond grinders in hard to reach areas.

Mixing

Premix Part A (resin), Part B (activator), and Part C (color pack) in a running rotary drum mixer. Mix parts together for approximately 30 seconds. Slowly add Part D (aggregate), and mix until a lump-free, thoroughly wetted-out matrix is obtained.

Installation

Install PlexiClad on primed substrate. Screed by spreader box or with a gauge rake. Immediately after placing, material must be hand-troweled or power-troweled to 1/4" thickness. Caution – Do not over trowel. Over troweling may cause blistering.

Cure Rate

	55°F	72°F	90°F
Foot traffic	14-16 hrs	9-10hrs	6-8 hrs
Medium loads	20-24 hrs	12-16 hrs	8-10 hrs
Heavy / CR	96 hrs	48 hrs	24 hrs

Finish

Lightly sand PlexiClad after curing. Allow 8 – 10 hours of cure @ 72°F after installation of PlexiClad before installing desired topcoat.





Physical Properties

Compressive Strength	ASTM C-579	12,500 psi
Tensile Strength	ASTM C-307	2,200 psi
Bond Strength	ASTM D-4541	>400 psi (100% concrete failure)
Hardness Shore D	ASTM D-2240	80-90
Abrasion Resistance CS-17 Wheel, 1 kg load	ASTM D-4060	<0.10 gm loss max
Coefficient of Friction – Standard Slip Resistance	ASTM D-2047	0.9
Flexural Modulus of Elasticity	ASTM D-790	6.0×10^{-5} psi
Flexural Strength	ASTM C-580	4,300 psi
Water Absorption	ASTM D-570	0.2%
Flammability	ASTM D-635	Self Extinguishing
Impact Resistance	MIL D-3134	No chipping, cracking or delaminating; Not more than 1/16 th of an inch permanent indentation
Coefficient of Linear Expansion	ASTM D-696	2×10^{-5} psi
VOC Content	40 CFR 59, Subpart D	Less than 50 grams per liter






Product Data Sheet For:**PLEXIGLAZE IFF**
Industrial Floor Finish**DESCRIPTION:**

PlexiGlaze Industrial Floor Finish is a 100% solids, low VOC, USDA accepted, pigmented, heavy-duty floor coating designed for industrial and commercial applications. PlexiGlaze Industrial Floor Finish is non-blushing and non-water spotting, bonds to cold, damp surfaces, and supports heavy industrial traffic. Although it cures into a very hard solid, it does not become brittle but retains a sufficient amount resilience to withstand impact and vibration. PlexiGlaze Industrial Floor Finish is the most advanced cyclo-aliphatic amine curing system of its kind. In addition, it is also resistant to fungus, mildew, and is anti-microbial.

Also available in PlexiGlaze Industrial Floor Finish CR (Chemical Resistant).**TYPICAL USES:**

-  Heavy duty epoxy floor coating
-  As a finish coat
-  An overlay
-  Primer/color coat

FEATURES:

-  Good chemical resistance
-  Convenient 2 to 1 ratio by volume
-  Tenacious bond to most substrates
-  Non-blushing / non-waterspotting
-  Low viscosity

COLORS:

PlexiGlaze Industrial Floor Finish standard colors are: white, gray, dark gray, tile red and beige. Custom colors are available.

PACKAGING:

PlexiGlaze Industrial Floor Finish is available in 1 gallon cans, 5 gallon pails, and 50 gallon drums.

SURFACE PREPARATION:

PlexiGlaze IFF requires preparation in order to perform as expected. Substrate must be profiled, clean sound, and dry. Substrate must be primed with PlexiSeal Surface tolerant epoxy primer or PlexiGlaze #4.

APPLICATION/SPREAD RATES:

PlexiGlaze Industrial Floor Finish is applied with a brush, roller, squeegee and trowel.

Spread rate will vary with desired thickness. PlexiGlaze Industrial Floor Finish is a versatile component used in PlexiQuartz, PlexiGard Shop Floor, PlexiClad, and PlexiChip epoxy systems. As a coating, PlexiGlaze Industrial Floor Finish is applied at 200 square feet per gallon to yield a dry film thickness of 8 mils per coat. See application instruction sheet for complete instructions.

LIMITATIONS:

This product is best suited for application in temperatures between 55°F and 95°F. Substrate must be clean, sound, and dry.

SPECIAL PURPOSE FORMULATIONS:

PlexiGlaze #4 Regular: For use on most typical installations, for normal use.

PlexiGlaze #4 "Cold Set": For cold area applications when temperature can not be maintained over 50°F, and when a more rapid cure is required at normal temperatures. Should not be used in topcoats due to yellowing.

PlexiGlaze #4 "Fast Set": Is used for quick turnaround time in room temperature areas. PlexiGlaze #4 "Fast Set" is ideal for total system usage when turnaround time is critical. It can also be used separately as a primer, body coat and topcoat. PlexiGlaze #4 "Fast Set" has excellent color retention. It can be used in lower

temperatures to accelerate the installation of the resinous flooring system.

MOISTURE CONCERNS:

Moisture vapor transmission in the slab should be measured prior to application of polymeric systems to ensure a long lasting, durable installation. Please refer to the master “Moisture Guidelines” for more information.

CHEMICAL RESISTANCE:

PlexiGlaze IFF is resistant to many common chemicals. Please refer to the master “Chemical Resistance Chart” for actual resistance to specific chemicals/reagents.

CLEANING

This product is considered to be a low maintenance flooring solution; however, certain textures and service environments require specific procedures. Please refer to the master “Cleaning Guide.”

TECHNICAL INFORMATION:

Hardness, Shore D	ASTM D-2240	80-85
Compressive Strength	ASTM D-695	12,200 psi
Flame Spread/NFPA 101	ASTM E-84	Class A
Tensile Strength	ASTM D-638	7,400 psi
Impact Resistance	MIL D -24613	0.0007”, no cracking or delamination
Flexural Strength	ASTM D – 790	5,100 psi
Bond Strength to Concrete	ACI-40	Substrate failure
Abrasion Resistance, CS17 Wheel, 1000g load, 1000 cycles	ASTM D-4060	0.29 mg loss
Water Absorption	MIL D-24613	0
Coefficient of Friction	ASTM D-2047	0.7 minimum
VOC Content		0 g/L
Solids Content		100%
Coefficient of Thermal Expansion		2x10 ⁻⁵ in/F
Flammability	ASTM D-635	Self-Extinguishing

PHYSICAL PROPERTIES:

Mix Ratio (by volume)	2 parts resin to 1 part hardener
Viscosity at 70 °F (mixed hardener & resin)	700 cps
Pot Life at 70 °F	20-25 minutes
Cure Time, Touch Dry at 70 °F (Cold Set)	4-6 hours
Cured Film Thickness	16 mils at 100 sq. ft./gallon spread rate
Salt Spray Resistance, 25% solution at 90 °F	No effect after 100 hours
Toxicity	Non-toxic, USDA approved

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BID SET

D

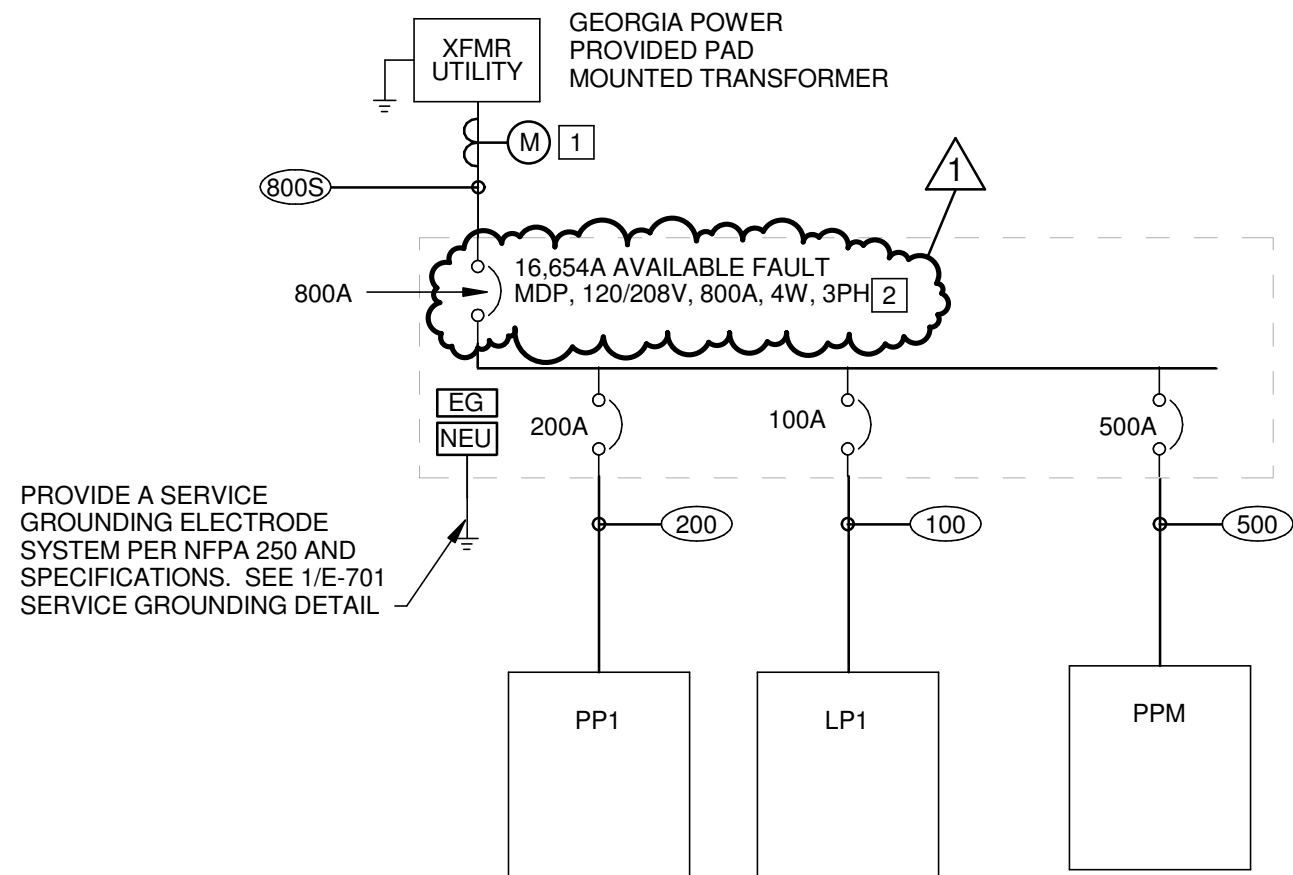
C

B

A

LIGHTING FIXTURE SCHEDULE					
FIXTURE	DESCRIPTION	LAMP	VOLTAGE (V)	MOUNTING	BASIS OF DESIGN
A	2'X4' LED LINEAR FIXTURE	LED	120	RECESSED	CR24-40L-40K
AE	SAME AS TYPE "A" EXCEPT WITH BATTERY BACKUP	LED	120	RECESSED	
B	2'X4' LED LINEAR FIXTURE	LED	120	PENDANT	LITHONIA-MSL-4000LM-SBL-120V-GZ10-35K-90CRI
BE	SAME AS TYPE "B" EXCEPT WITH BATTERY BACKUP	LED	120	PENDANT	
C	WALL MOUNTED LOW PROFILE LED EXTERIOR FIXTURE	LED	120	WALL	CREE- XSPW-A-0-2-F-G-1-T
CE	SAME AS TYPE "C" WITH BATTERY BACK UP	LED	120	WALL	
D	4' LED WET LOCATION LINEAR LUMINAIRE	LED	120	SURFACE	CREE- WS4-50L-40K-10V-FD-SSL
DE	SAME AS TYPE "D" EXCEPT WITH BATTERY BACKUP	LED	120	SURFACE	
F	6" APERTURE SQUARE LED DOWNLIGHT	LED	120	RECESSED	CREE- KR-6-S-30L-35K-120-10V
FE	SAME AS TYPE "F" EXCEPT WITH BATTERY BACK UP	LED	120	RECESSED	
G	6" APERTURE SQUARE LED DOWNLIGHT	LED	120	RECESSED	CREE- KR-6-S-13L-35K-120-10V
H	OUTDOOR LED CAT SCONCE WITH BATTERY BACKUP	LED	120	SURFACE WALL	OLCS-8-DDB
HE	SAME AS TYPE H EXCEPT WITH BATTERY BACKUP	LED	120	SURFACE WALL	OLCS-8-DDB
I	2'X4' LED DOWNLIGHT	LED	120	SURFACE	CREE CR24 40L-35K
IE	SAME AS FIXTURE TYPE "I" EXCEPT WITH BATTERY BACKUP	LED	120	SURFACE	CREE CR24 40L-35K
J	6" LED DOWNLIGHT WET LISTED PROVIDE WITH COMPATIBLE HOUSING	LED	120	RECESSED	CREE CR4-575L35K-12-GU24
K	2'X4' LED DOWNLIGHT	LED	120	SURFACE	CR24-50L-40K-10V
KE	SAME AS TYPE "K" EXCEPT WITH BATTERY BACKUP	LED	120	SURFACE	
XE	LED EXIT SIGN	LED	120	WALL/CEILING	LITHONIA LE SW 1/2 R-277 EL VR SD

MECHANICAL/PLUMBING EQUIPMENT CONNECTION SCHEDULE							
LOAD NAME	UNIT DESCRIPTION	VOLTA GE	PHASE	BRANCH CIRCUIT CONDUCTOR	DISCONNECT	PANEL	COMMENTS
DCU-1 & DSS-1	CONDENSING UNIT	208 V	1	2#12,1#12G. 3/4"C.	30/1P/15A/3R	PPM	DSS-1 UNIT TO BE POWERED BY DCU-1. INTERCONNECT PER MANUFACTURER'S RECOMMENDATIONS
DCU-2, DSS-2	CONDENSING UNIT	208 V	1	2#12,1#12G. 3/4"C.	30/1P/15A/3R	PPM	DSS-2 UNIT TO BE POWERED BY DCU-2. INTERCONNECT PER MANUFACTURER'S RECOMMENDATIONS
DOAS-1	OUTSIDE AIR UNIT	208 V	3	3#1/0,1#6G. 1-1/2"C.	BY DIV 23	PPM	
DOAS-2	OUTSIDE AIR UNIT	208 V	3	3#1/0,1#6G. 1-1/2"C.	BY DIV 23	PPM	
EF-1,2	EXHAUST FANS	120 V	1	2#12,1#12G. 3/4"C.	BY DIV 23	PP1	
EUH-1	ELECTRIC UNIT HEATER	208 V	1	2#12,1#12G. 3/4"C.	BY DIV 23	PPM	
EUH-2	ELECTRIC UNIT HEATER	208 V	1	2#12,1#12G. 3/4"C.	BY DIV 23	PPM	
GWH-1	WATER HEATER	120 V	1	2#12,1#12G. 3/4"C.	SINGLE POLE MOTOR RATED SWITCH	PPM	
HWRP-1	HOT WATER PUMP	120 V	1	2#12,1#12G. 3/4"C.	SINGLE POLE MOTOR RATED SWITCH	PP1	
IRH-1 & IRH-2	INFRARED HEATER	120 V	1	2#12,1#12G. 3/4"C.	BY DIV 23	PPM	
RTU-1	ROOF TOP UNIT	208 V	3	3#6, 1#10G.-1"C.	BY DIV 23	PPM	
RTU-2	ROOF TOP UNIT	208 V	3	3#8, 1#10G. 1"C.	BY DIV 23	PPM	
RTU-3	ROOF TOP UNIT	208 V	3	3#8, 1#10G. 1"C.	BY DIV 23	PPM	



1 Electrical One Line
SCALE: N.T.S.

ELECTRICAL ONE-LINE FEEDER SCHEDULE	
TAG	FEEDER SIZE & CONDUIT
100	4#1, 1#8 GND, 1-1/2"C
200	4#3/0, 1#6 GND, 2"C
500	2 SETS OF 4#250 kCMIL, 1#2 GND, 2-1/2"C
800S	2 SETS, 4#500 kCMIL, 4"C

KEYNOTES: [#]

- UTILITY METER, PEDESTAL MOUNT ADJACENT TO UTILTIY TRANSFORMER. ROUTE 1"C BETWEEN TRANSFORMER AND METER FOR UTILITY CONNECTIONS. PROVIDE SERVICE ENTRANCE DISCONNECT AS REQUIRED BY UTILITY COMPANY. COORDINATE WITH UTILITY PRIOR TO INSTALLATION.
- PROVIDE WITH INTEGRAL SPD

CLAYTON COUNTY	DESIGNED BY: CTB	DATE: 04/15/15
	DWN BY: CKD BY: HLB	SOLICITATION NO.:
	SUBMITTED BY: KDC	CONTRACT NO.:
	PLOT SCALE: 1/2" = 1'-0"	FILE NO.:
ANSI D		FILE NAME:

CLAYTON COUNTY ANIMAL
CONTROL
ANVIL BLOCK ROAD
ELLENWOOD, GEORGIA 30294
ELECTRICAL SCHEDULES AND
ONE-LINE

SHEET
IDENTIFICATION
E-201

CLAYTON COUNTY

POND[®]
3500 Parkway Lane, Suite 600
Norcross, GA 30092
Phone (678) 336-7740
Fax (678) 336-7744
JOB NO. 1140324

LIGHTING PLAN

SECTION 283113

FIRE ALARM PANELS

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Provide combination intrusion detection and fire alarm control panels, including engineering, components, installation and commissioning.

1.2 RELATED SECTIONS

- A. Section 283113: Conductors and Cables for Electronic Safety and Security.

1.3 REFERENCES

- A. Reference Standards: Provide systems which meet or exceed the requirements of the following publications and organizations as applicable to the Work of this Section:
 - 1. Underwriters Laboratories Inc. (UL):
 - a. UL 268: Smoke Detectors for Fire Protective Signaling Systems.
 - b. UL 365: Police Station Connected Burglar Alarm Units and Systems.
 - c. UL 609: Local Burglar Alarm Units and Systems.
 - d. UL 611: Central Station Burglar-Alarm Units.
 - e. UL 636: Holdup Alarm Units and Systems.
 - f. UL 684: Local, Central Station, and Remote Station.
 - g. UL 864: Control Units for Fire Protective Signaling Systems.
 - h. UL 985: Household Fire Warning System Units.
 - i. UL 1023: Household Burglar-Alarm System Units.
 - j. UL 1076: Proprietary Burglar-Alarm Units and Systems.
 - k. UL 1610: Central-Station Burglar-Alarm Units.
 - 2. Federal Communications Commission (FCC):
 - a. Code of Federal Regulations Title 47: Part 15: Radio Frequency Devices.
 - b. Code of Federal Regulations Title 47: Part 68: Connection of Terminal Equipment to the Telephone Network.
 - 3. National Fire Protection Association (NFPA):
 - a. NFPA 70: National Electrical Code
 - b. NFPA 72: National Fire Protection Code.

1.4 SYSTEM DESCRIPTION

- A. Combination Intrusion Detection and Fire Alarm Control Panels: Basis-of-design is the Honeywell VISTA 128FBP System, a burglary/access control/CCTV switching system that includes the following capabilities:
1. Listed for UL Commercial Fire and Burglary.
 2. Supports up to 128 zones.
 3. Supports up to 8 separate partitions.
 4. Supports up to 150 users.
 5. Supports commercial wireless devices.
 6. Provides integrated security, access control, and CCTV switching capability.
 7. Provides supervision of peripheral devices.
 8. Supports up to 96 optional relay outputs.
 9. Supports long-range radio (LRR) communication.
 10. Provides scheduling capability to allow for automated operations.
 11. Supports up to 8 alphanumeric paging devices.
 12. Supports panel linking.
 13. Supports alarm reporting via Internet.
 14. Interfaces with automation software.
 15. Monitors smoke detector maintenance signals
 16. Capable of being installed using existing wiring

1.5 SUBMITTALS

- A. Manufacturer's Product Data: Submit manufacturer's data sheets indicating systems and components proposed for use, including instruction manuals.
- B. Shop Drawings: Submit complete shop drawings including connection diagrams for interfacing equipment, list of connected equipment, and locations for major equipment components.
- C. Record Drawings: During construction maintain record drawings indicating location of equipment and wiring. Submit an electronic version of record drawings not later than Substantial Completion of the project.
- D. Operation and Maintenance Data: Submit manufacturer's operation and maintenance data, customized to the system installed. Include system and operator manuals.
- E. Field Tests: Submit results of field testing of every device including date, testing personnel, retesting date if applicable, and confirmation that every device passed field testing.
- F. Maintenance Service Agreement: Submit a sample copy of the manufacturer's maintenance service agreement, including cost and services for a one year period for

Owner's review. Maintenance shall include, but not be limited to, labor and materials to repair the system, provide test and adjustments, and regular inspections.

1.6 QUALITY ASSURANCE

- A. Manufacturer: Minimum ten years experience in manufacturing and maintaining similar systems. Manufacturer shall provide toll-free technical assistance and support available 24/7. Alarm manufacturer shall be certified compliant with ISO 9001.
- B. Installer: Minimum two years experience installing similar systems, and acceptable to the manufacturer.
- C. Environmental Conditions: System shall be designed to function in the following environmental conditions:
 - 1. Storage Temperature: Designed for a storage temperature of -10° C to 70°C.
 - 2. Operating Temperature: System shall be designed for an operating temperature of 0° C to 50°C (32° F to 120°F).
 - 3. Humidity: System shall be designed for normal operation in an 85% relative humidity environment.
 - 4. Electromagnetic Interference: System shall meet or exceed the requirements of FCC Part 15, Class B devices, FCC Part 68, IEC EMC directive.
- D. Power Requirements: Components shall have the following electrical specifications. The system shall operate using standard 120 VAC, 50 Hz/60 Hz power.
 - 1. Control Primary Power: Transformer power shall be 18 VAC, 72 VA.
 - 2. Backup Battery: Rechargeable 12 VDC, gel type, lead acid backup battery shall be provided. The battery shall be rated between 12 and 34-ampere hours (AH).
 - 3. Alarm Power: 12 VDC, 1.7 amps for each bell output
 - 4. Auxiliary Standby Power: 12 VDC, 1 amp maximum.
 - 5. Total Power: Combined auxiliary standby and alarm currents shall be 2.3 amps.
 - 6. Fusing: The battery input, auxiliary, and bell outputs shall be protected using PTC circuit breakers. All outputs shall be power limited.
 - 7. Power Supply: 24-volt power supply shall provide 24 vdc, 3.4 amps full-wave rectified, unfiltered outputs
- E. Control Panel Enclosure: A metal cabinet, suitable for wall mounting. Dimensions shall not exceed 14.5 inches (36.8 cm) in height, 12.5 inches (31.8 cm) in width or 3 inches (7.6 cm) in depth.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials in manufacturer's labeled packages. Store and handle in accordance with manufacturer's requirements, in a facility with environmental conditions within recommended limits.

1.8 WARRANTY

- A. Manufacturer's Warranty: Submit manufacturer's standard one-year warranty for the system.

PART 2 PRODUCTS

2.1 MANUFACTURER

- A. Intrusion Detection and Fire Alarm Panel Manufacturer: VISTA 128FBP by Honeywell, www.security.honeywell.com.

2.2 SYSTEM PERFORMANCE

- A. Control Panel: The control panel shall be an 8-partition, UL commercial fire and burglary control panel that supports up to 128 zones using basic hardwired, polling loop, and wireless zones. It shall also provide supervision of 2 notification appliance output circuits (NAC), RF receivers, and relay modules. The control shall provide the ability to schedule time-driven events, and allow certain operations to be automated by pressing a single button. The system shall be capable of interfacing with an ECP long range radio (LRR) unit that can send Contact ID messages, and alphanumeric paging devices. The control shall provide integrated access control and CCTV-switching capability with the use of a single downloader and database.
 - 1. Basic Hardwired Zones: Control shall provide 8 style-B hardwire zones with the following characteristics:
 - a. EOLR supervision (optional for zones 2-8) shall support N.O. or N.C. sensors (EOLR supervision required for UL installations).
 - b. Zones/Points shall be individually assignable to any partition.
 - c. Supports up to 64 two-wire smoke detectors on two selected zones.
 - d. Supports four-wire smoke or heat detectors on any zone (power to four-wire smoke detectors must be supervised with an EOL device).
 - e. Supports up to 50 two-wire latching glass break detectors on one selected zone.
 - f. Individually assignable to Notification Appliance (NAC) outputs and/or auxiliary relays.
 - 2. Optional Expansion Zones:
 - a. Polling Loop Expansion: Control shall support up to 120 additional hardwire zones using a built-in two-wire polling (multiplex) loop

- interface. The polling loop shall provide power and data to remote point modules, and constantly monitor the status of all zones on the loop. Maximum current draw shall not exceed 128 mA. The polling loop zones shall have the following characteristics:
- 1) Interface with RPM (Remote Point Module) devices that provide Class B, Style Y (e.g., 4208U/4208SN) or a combination of Class B, Style Y, and Class A, Style Z (e.g., 4208SNF) zones.
 - 2) Individually assignable to one of 8 partitions.
 - 3) Supervised by the control panel.
 - 4) A 12,000 ft (3658 m) wire run capability without using shielded cable.
 - 5) Each RPM (Remote Point Module) enclosure shall be tamper protected.
- b. Wireless Expansion Zone: Control shall support up to 128 wireless zones using a 5800 series RF receiver (fewer if using hardwire and/or polling loop zones). Wireless zones shall have the following characteristics:
- 1) Supervised by control panel for check-in signals (except certain non-supervised transmitters).
 - 2) Tamper-protection for supervised zones.
 - 3) Individually assignable to one of 8 partitions.
 - 4) Individually assignable to bell outputs and/or auxiliary relays.
 - 5) Support wireless devices listed for Commercial Burglary using the 5881ENHC RF Receiver.
3. Partitions: Control shall provide the ability to operate e8 separate areas, each functioning as if it had its own control. Partitioning features shall include:
- a. A Common Lobby partition (1-8), which can be programmed to perform the following functions:
 - 1) Arm automatically when the last partition that shares the common lobby is armed.
 - 2) Disarm when the first partition that shares the common lobby is disarmed.
 - b. A Master partition (9), used strictly to assign keypads for the purpose of viewing the status of all 8 partitions at the same time (master keypads).
 - c. Assignable by zone.
 - d. Assignable by keypad/annunciator.
 - e. Assignable by relay to one or all 8 partitions.
 - f. Ability to display fire and/or burglary and panic and/or trouble conditions at all other partitions' keypads (selectable option).
 - g. Certain system options selectable by partition, such as entry/exit delay and subscriber account number.
4. User Codes: Control shall accommodate 150 user codes, all of which can operate any or all partitions. Certain characteristics must be assigned to each user code, as follows:
- a. Authority level (Master, Manager, or several other Operator levels). Each User Code (other than the installer code) shall be capable of being

- assigned the same or a different level of authority for each partition that it will operate.
- b. Opening/Closing central station reporting option.
 - c. Specific partitions that the code can operate.
 - d. Global arming capability (ability to arm all partitions the code has access to in one command).
 - e. Use of an RF (button) to arm and disarm the system (RF key must first be enrolled into the system).
5. Peripheral Devices: Control shall support up to 30 addressable ECP devices, which can be any combination of keypads, RF receivers, relay modules, annunciator modules, and interactive phone modules. Peripheral devices have the following characteristics:
- a. Each device set to an individual address according to the device's instructions.
 - b. Each device enabled in system programming.
 - c. Each device's address shall be supervisable (via a programming option).
6. Keypad/Annunciator: Control shall accommodate up to 16 keypads or three (3) touch-screen (i.e.; advanced user interface) keypads. The keypads shall be capable of the following
- a. Performing all system arming functions.
 - b. Being assigned to any partition.
 - c. Providing four programmable single-button function keys, which can be used for:
 - 1) Panic Functions: activated by wired and wireless keypads; reported separately by partition.
 - 2) Keypad Macros: 32 keypad macro commands per system (each macro is a series of keypad commands). Assignable to the A, B, C, and D keys by partition.
7. Optional Output Relays: A total of 96 relay outputs shall be accommodated using relay modules. Each relay module shall provide four (4) Form C (normally open and normally closed) relays for general-purpose use or two (2) Class-B, Style-Y supervised notification appliance circuit outputs, when using the 4204CF module. The relays shall be capable of being:
- a. Programmed to activate in response to system events.
 - b. Programmed to activate using time intervals.
 - c. Activated manually.
 - d. Assigned an alpha descriptor.
 - e. Used for Class B, Style-Y supervised bell outputs (4204CF module).
 - f. A combination of 4204 (ECP) and 4101SN (polling loop) relays.
8. Optional Vista Interactive Phone Module: The control shall support the ADEMCO 4285/4286 VIP Modules, which permit access to the security system in order to perform the following functions:
- a. Obtain system status information.
 - b. Arm and disarm the security system.
 - c. Control relays.

9. Optional LED Annunciator: The control shall support the ADEMCO FSA-8 and FSA-24 annunciators, which are capable of:
 - a. Visually identifying a zone or point that is in alarm or trouble.
 - b. Programmable for system silence/reset.
 - c. Up to 96 LEDs may be used in one system.
 - d. A total of four (4) FSA-24 or 12 FSA-8 annunciators may be used in one system.
 - e. An optional keyswitch, FSAKSM module, shall be available for UL listed Silence and Reset capability.
10. Notification Appliance Circuits (NAC): Control panel shall internally provide two supervised NAC outputs for operating fire and burglar alarm notification appliances. It shall also support additional supervised bell outputs when using 4204CF relay modules. Each NAC output shall be rated at 10-14 VDC, 1.7 amp max power limited. Total alarm current draw when using two NAC outputs shall not exceed 2.3 amps for battery independent operation.
11. Auxiliary Relay: A built-in Form C relay shall be provided. The relay contacts shall be rated at 28 VAC/VDC, 2.8 amps maximum. The relay shall support:
 - a. Alarm activation.
 - b. Trouble/supervisory activation.
 - c. Reset of four-wire smoke detectors.
 - d. Battery saving feature.
12. Integrated Access Control: Control shall be capable of the following:
 - a. Providing a command that activates relays to allow access doors to open (e.g., lobby door), lights to be turned on or off, etc.
 - b. Becoming a fully integrated access control system by using numerous VistaKey Single-Door Access Control Modules.
 - c. Supporting up to 15 VistaKey Access Control Modules. The VistaKey Access Control Modules shall use the same Compass Downloader as the Vista-128FBP and shall be programmable from the Compass Downloader or the Keypad/Annunciators.
 - d. Assigning any number of access control relays to each partition (up to 96 for the system).
 - e. Supporting up to 500 access card holders using VistaKey.
 - f. Connecting to the ADEMCO PassPoint Access Control System via the Vista Gateway Module (VGM).
13. CCTV Switching: System shall be capable of supporting the VistaView 100 CCTV Switching System. The CCTV system shall be fully integrated and be event driven by Fire, Burglary or Access events. When cameras are not event driven, they shall be driven by an automatic preset dwell time. The system shall also be capable of:
 - a. Activating the CCTV system via a Form-C relay output.
 - b. Operating up to 60 camera inputs and 30 video outputs.
14. Commercial Wireless Equipment: Control shall be compatible with UL Listed Commercial Wireless Fire & Security equipment including:
 - a. ADEMCO 5881ENHC Commercial Fire/Burg Receiver.: The receiver shall be capable of receiving as many points as the control panel is rated

- for. Up to two (2) Receivers may be used on any system. Receivers may be remotely located anywhere on the system Keypad/Annunciator bus.
- b. ADEMCO 5808LST Wireless Photoelectric Smoke and Heat Detector: The device shall be UL 268 listed and shall have Maintenance Alert capability and Automatic Drift Compensation.
 - c. ADEMCO 5809 Wireless 135D Fixed Temperature and Rate of Rise Heat Detector: The device shall be UL 521 listed for commercial applications.
 - d. ADEMCO 5817CB Wireless Universal Contact Monitoring Transmitter: This device shall be capable of making any conventional UL listed contact device a wireless device. The device shall be UL listed for commercial fire and burglary applications as follows: UL 864, 985 for fire and UL 365, 609, 1023, 1076 and 1610 for security and nurse call.
 - e. ADEMCO 5869 Wireless Hold Up Switch/Transmitter: This device shall be UL 636 listed for commercial burglary applications.
15. Optional Keyswitch: Control shall support the ADEMCO 4146 Keyswitch on any one of the system's 8 partitions. If used, zone 7 is no longer available as a protection zone.
16. Voltage Triggers: System shall provide voltage triggers, which change state for different conditions. Used with LRR (Long Range Radio) equipment or other devices such as a remote keypad sounder, keyswitch ARMED and READY LEDs, or a printer to print the system's event log.
17. Event Log: System shall maintain a log of different event types (enabled in programming). The event log shall provide the following characteristics:
- a. Stores up to 512 events.
 - b. Viewable at the keypad or through the use of Compass software.
 - c. Printable on a serial printer using a 4100SM Module including zone alpha descriptors.
 - d. Stores PassPoint access control events.
 - e. Sends printed events to up to eight alpha numeric pagers.
18. Scheduling: Provides the following scheduling capabilities:
- a. Open/close schedules (for control of arming/disarming and reporting).
 - b. Holiday schedules (allows different time windows for open/close schedules).
 - c. Timed events (for activation of relays, auto-bypassing and un-bypassing, auto-arming and disarming, etc.).
 - d. Access schedules (for limiting system access to users by time).
 - e. End User Output Programming Mode (provides 20 timers for relay control).
 - f. The system shall automatically adjust for daylight savings time.
19. Communication Features: Supports the following formats and features for the primary and secondary central station receivers:
- a. Formats: ADEMCO Low Speed (Standard or Expanded); SESCOA/Radionics; ADEMCO Express; ADEMCO High Speed; ADEMCO Contact ID.

- b. Backup reporting: The system shall support backup reporting via the following: Secondary phone number; ECP long-range radio (LRR) interface; option to select long range radio (LRR) or dialup as the primary reporting method (dynamic signaling feature).
 - c. Internet reporting: The system shall be capable of communicating with the central station via the internet using Alarmnet-i. It shall provide the user with the ability to control the system via a browser interface (i.e., AOL, Netscape, Internet Explorer). All packet data transmitted to the monitoring station shall be encrypted with a minimum of 1024 bits of encryption.
- 20. Audio Alarm Verification Option: Provides a programmable Audio Alarm Verification (AAV) option that can be used in conjunction with an output relay to permit voice dialog between an operator at the central station and a person at the premises.
- 21. Cross-Zoning Capability: Helps prevent false alarms by preventing a zone from going into alarm unless its cross-zone is also faulted within 5 minutes.
- 22. Pager Interface: Control Panel shall be capable of sending event information to an alphanumeric pager via a pager interface device.
- 23. 24-Volt Power Supply: Control Panel shall be compatible with a 24-Volt power supply module. The module shall supply 24 vdc, 3.4 amps, rectified, unfiltered outputs, which power:
 - a. Alarm notification appliances, including but not limited to sirens horns, bells and strobes.
 - b. Auxiliary devices capable of operating using full-wave rectified unfiltered voltage.
- 24. Exit Error False Alarm Prevention Feature: System shall be capable of differentiating between an actual alarm and an alarm caused by leaving an entry/exit door open. If not subsequently disarmed, the control panel shall:
 - a. Bypass the faulted E/E zone(s) and/or interior zones and arm the system.
 - b. Generate an Exit Error report by user and by zone so the central station knows it was an exit alarm and who caused it.
- 25. Enhanced Fire Walk-Test Mode: Control Panel shall provide the installer with the following features:
 - a. Automatic test of all integrated remote point module (RPM) devices, equipped with an automatic test feature.
 - b. While automatic test is in progress all fire zones that remain untested shall be displayed.
 - c. An event log shall be capable of logging the results of tested and untested zones.
 - d. The ability to report the result of tested and untested zones to the central station.
- 26. Built-in User's Manual and Descriptor Review: For end-user convenience, the control panel shall contain a built-in User's Manual. It shall include the following capabilities:

- a. By depressing any of the function keys on the keypad for five (5) seconds, a brief explanation of that function shall scroll across the alphanumeric display.
 - b. By depressing the READY key for five (5) seconds, all programmed zone descriptors shall be displayed (one at a time). This feature shall provide a check for installers and ensure all descriptors have been entered properly.
27. Programming: Control shall be capable of being programmed locally or remotely using the ADEMCO Compass Downloader and shall be capable of:
 - a. Uploading and downloading all programming information at 300 baud.
 - b. Uploading and displaying firmware revision levels from the control.
28. Panel Linking: Control shall be capable of being networked together with up to eight other controls and being operated by any keypad within the system. It shall provide the ability for users to:
 - a. Control multiple zones, partitions, and/or buildings from a central location.
 - b. Check status, arm and disarm any partition from any keypad in the system.
 - c. Globally arm or disarm partitions based upon user authority.
29. Automation Software: The Control shall be capable of interfacing with automation software via an RS232 input on a single partition.

2.3 COMPONENTS

- A. System Integration: System shall integrate with facility doors, windows, and departments. The system shall also integrate with external systems, such as building appliances and building alert systems for remote control and central collection of external system alerts. When integrated with external systems, the system shall connect to the external system to receive status changes by way of a dry contact output from the external system. The system shall use its user interface to provide local status messages from external systems, providing for the initiation of local building policies. Optionally, the system may transmit information to an off-site monitoring service to provide initiation of remote policies when appropriate. The installer shall follow manufacture's instructions when installing and programming system equipment.
 1. V-Plex Bus Extensions: Extended system V-Plex bus branch circuits shall be scaleable to increase the total size of the bus in larger installations. Branch circuits leading from different buildings or from different floors in multi-story buildings shall be isolated from one another so that a shorted or grounded branch circuit is isolated away from other near-side branch circuits, allowing other V-Plex devices to be isolated so that they can continue to operate.
 2. Zone Input: System zone inputs allow the system to sense the change in state of an output from an external device, such as a door/window position sensor, a motion detector, a relay output from an appliance, the output of an external alert system, or other devices that provide a dry closure output.

3. Fire Alarm Heat Detectors: Selected areas in the facility will use Heat detectors to sense rapid increases of heat caused by spot fires. The quantity and spacing of detectors shall meet those suggested by UL, NFPA and other recognized agencies. Locations for Spot fire heat detectors may be in kitchens, laboratories, server rooms, classrooms or other areas where required. For each Heat detector, install a Honeywell 4193SN zone input module and a listed Spot fire heat detector.
4. Fire System Smoke Detectors: Selected areas in the facility will use Smoke detectors to sense the buildup of Smoke caused by fires and smoldering objects. The quantity and spacing of detectors shall meet those suggested by UL, NFPA and other recognized agencies and building codes. Locations for Smoke detectors may be in hallways, laboratories, server rooms, classrooms or other areas where required. Where designated in plans for each Smoke detector, install a Honeywell 5193SDT or 5193D Smoke detector or equivalent.
5. Fire Suppression System Activation: Monitor the status of the Fire Suppression system, and shall initiate a Fire alarm when water in the suppression system flows for a specified amount of time. The water flow sensor shall connect to a 4193SN or equivalent.
6. Post Indicator Valves: Monitor tamper switches inside of Post Indicator or other designated Fire Suppression System control valves. The Post Indicator valve shall connect to a zone input module or a zone input on the FACP.
7. Automatic Duct Damper Control: Selected HVAC ducts in the facility will use system automatic duct control capabilities to close duct dampers in the event of particular system events, such as in the case of a fire alarm. For each automatic duct damper, install a 4101SN relay output module.
8. Automatic Door Holders: Selected doors in the facility will use system automatic door holder capabilities to hold doors open until particular system events release the door. For each automatic locking door, install a 4101SN relay output module, a power supply, and an electric magnetic door holder device.
9. Manual Pull Stations: Include manual fire alarm stations near exits, stairwells, and other locations recommended by UL, NFPA, and local building codes. The manual pull station shall be the Honeywell Model 5140MPS-1 and a 4193SN or equivalent.
10. Knox Box Tamper: Monitor tamper switches inside of Knox Boxes or other Fire Department key cabinets. The key cabinet shall be a Knox Box and a 4193SN or equivalent.
11. Hood Fire Suppression: Include a connection to each stove hood suppression alarm to supervise its charge and discharge statuses as required by UL, NFPA, and local building codes. The hood suppression system alarm and trouble outputs shall be connected to a 4193SN zone input module or equivalent.
12. Fire System Beam Type Smoke Detectors: Selected areas in the facility will use Beam Smoke detectors to sense the buildup of Smoke caused by fires and smoldering objects. The quantity and spacing of detectors shall meet those suggested by UL, NFPA and other recognized agencies and building codes.

Locations for Smoke detectors may be in hallways, laboratories, server rooms, meeting rooms or other areas where required. For each Smoke detector, install a Honeywell BK-Beam1224 Smoke detector.

13. Fire Alarm Initiating Devices: Include a connection to each initiating device to supervise its idle, trouble, and alarm statuses as required by UL, NFPA, and local building codes. The fire initiating device alarm and trouble outputs shall be connected to a 4193SN zone input module or equivalent.
14. Fire System Duct Smoke Detectors: Selected areas in the facility will use Duct Smoke detectors to sense smoke in HVAC supply and return air ducts. The quantity and spacing of detectors shall meet those suggested by UL, NFPA and other recognized agencies and building codes. Locations for Duct Smoke detectors may be in hallways, laboratories, server rooms, classrooms or other areas where required. For each Duct Smoke detector, install a Honeywell zone input module and a listed Duct Smoke detector.
15. Wireless Smoke Detectors: Include wireless smoke detectors in designated locations. The when the wireless smoke detector is triggered into alarm, it shall send alarm messages at four second intervals until the wireless smoke detector restores to its idle condition. Each wireless smoke detector shall send periodic check-in signals to its associated control panel. The smoke detector's associated control panel shall report any missing smoke detector within four and one-half hours. Each smoke detector shall report any low battery condition a minimum of seven days before its battery becomes too discharged to power the smoke detector. The smoke detector's associated control panel shall report any low battery condition by providing a local indication at system keypads, and shall send a trouble report to the central monitoring station. The wireless smoke detector shall include a head tamper switch and a rear tamper switch so that it shall send a tamper alarm in the event that the smoke detector's head is removed, or if the smoke detector is removed from its mounting surface. The model number of the wireless smoke detector shall be Honeywell 5808LST or equivalent.
16. Wireless Heat Detectors: Include wireless heat detectors in designated locations. The when the heat detector is triggered into alarm, the heat detector shall send alarm messages at four second intervals until the heat detector is restored to its normal condition. Each wireless heat detector shall send periodic check-in signals to its associated control panel. The heat detector's associated control panel shall report any missing heat detector within four and one-half hours. Each heat detector shall report any low battery condition a minimum of seven days before its battery becomes too discharged to power the heat detector. The heat detector's associated control panel shall report any low battery condition by providing a local indication at system keypads, and shall send a trouble report to the central monitoring station. The wireless heat detector shall include a head tamper switch so that it shall send a tamper alarm in the event that the heat detector 's head is removed. The model number of the wireless heat detector shall be Honeywell 5809 or equivalent.
17. Wireless Manual Fire Pull Station: Include Wireless Manual Fire Pull Stations and wireless transmitters at designated locations. The when the manual pull

station is triggered into alarm, the wireless transmitter shall send alarm messages at four second intervals until the wireless manual pull station is restored to its normal position. Each wireless transmitter shall send periodic check-in signals to its associated control panel. The transmitter's associated control panel shall report any missing transmitter within four and one-half hours. Each transmitter shall report any low battery condition a minimum of seven days before its battery becomes too discharged to power the transmitter. The transmitter's associated control panel shall report any low battery condition by providing a local indication at system keypads, and shall send a trouble report to the central monitoring station. The wireless transmitter shall include a cover tamper switch and a rear tamper switch so that it shall send a tamper alarm in the event that the transmitter's cover is removed, or if the transmitter is removed from its mounting surface. The model number of the wireless Manual Fire Pull Stations shall be Honeywell 5140MPS-1 and the 5817CB or equivalent.

18. Wireless Fire Suppression Waterflow Detection: Include Wireless Fire Suppression Waterflow Detection at each fire suppression sprinkler riser pipe. The when the waterflow detector is triggered into alarm, the wireless transmitter shall send alarm messages at four second intervals until the wireless waterflow detector is restored to its normal position. Each wireless transmitter shall send periodic check-in signals to its associated control panel. The transmitter's associated control panel shall report any missing transmitter within four and one-half hours. Each transmitter shall report any low battery condition a minimum of seven days before its battery becomes too discharged to power the transmitter. The transmitter's associated control panel shall report any low battery condition by providing a local indication at system keypads, and shall send a trouble report to the central monitoring station. The wireless transmitter shall include a cover tamper switch and a rear tamper switch so that it shall send a tamper alarm in the event that the transmitter's cover is removed, or if the transmitter is removed from its mounting surface. The model number of the wireless transmitter is the 5817CB or equivalent.
19. Wireless Post Indicator Valve Tamper: Include Wireless Post Indicator Valve Tamper Detection at each fire suppression sprinkler system Post Indicator Valve. The when the Post Indicator Valve Tamper is triggered into alarm, the wireless transmitter shall send supervisory messages at four second intervals until the Post Indicator Valve Tamper Switch is restored to its normal position. Each wireless transmitter shall send periodic check-in signals to its associated control panel. The transmitter's associated control panel shall report any missing transmitter within four and one-half hours. Each transmitter shall report any low battery condition a minimum of seven days before its battery becomes too discharged to power the transmitter. The transmitter's associated control panel shall report any low battery condition by providing a local indication at system keypads, and shall send a trouble report to the central monitoring station. The wireless transmitter shall include a cover tamper switch and a rear tamper switch so that it shall send a tamper alarm in the event that the transmitter's cover is removed, or if the transmitter is removed from its

- mounting surface. The model number of the wireless transmitter is the 5817CB or equivalent.
20. Wireless Knox Box Tamper Supervision: Include Wireless Knox Box Tamper Supervision at each Knox Box Fire Department key safe. The when the Knox Box Tamper is triggered into alarm, the wireless transmitter shall send supervisory messages at four second intervals until the Knox Box Tamper Switch is restored to its normal position. Each wireless transmitter shall send periodic check-in signals to its associated control panel. The transmitter's associated control panel shall report any missing transmitter within four and one-half hours. Each transmitter shall report any low battery condition a minimum of seven days before its battery becomes too discharged to power the transmitter. The transmitter's associated control panel shall report any low battery condition by providing a local indication at system keypads, and shall send a trouble report to the central monitoring station. The wireless transmitter shall include a cover tamper switch and a rear tamper switch so that it shall send a tamper alarm in the event that the transmitter's cover is removed, or if the transmitter is removed from its mounting surface. The model number of the wireless transmitter is the 5817CB or equivalent.
 21. Wireless Duct Smoke Detectors: Include Wireless Duct Smoke Detectors Alarms at each Duct Smoke Detector. The when the Duct Smoke Detector is triggered into alarm, the wireless transmitter shall send supervisory messages at four second intervals until the Duct Smoke Detector is restored to its normal position. Each wireless transmitter shall send periodic check-in signals to its associated control panel. The transmitter's associated control panel shall report any missing transmitter within four and one-half hours. Each transmitter shall report any low battery condition a minimum of seven days before its battery becomes too discharged to power the transmitter. The transmitter's associated control panel shall report any low battery condition by providing a local indication at system keypads, and shall send a trouble report to the central monitoring station. The wireless transmitter shall include a cover tamper switch and a rear tamper switch so that it shall send a tamper alarm in the event that the transmitter's cover is removed, or if the transmitter is removed from its mounting surface. The model number of the wireless transmitter is the 5817CB or equivalent.
 22. Wireless Fire Suppression System Activation Detection: Include Wireless Fire Suppression System Activation Detection Alarms at each Fire Suppression System. The when the Fire Suppression System is triggered into alarm, the wireless transmitter shall send supervisory messages at four second intervals until the Fire Suppression System is restored to its idle state. Each wireless transmitter shall send periodic check-in signals to its associated control panel. The transmitter's associated control panel shall report any missing transmitter within four and one-half hours. Each transmitter shall report any low battery condition a minimum of seven days before its battery becomes too discharged to power the transmitter. The transmitter's associated control panel shall report any low battery condition by providing a local indication at system keypads, and shall send a trouble report to the central monitoring station. The wireless

transmitter shall include a cover tamper switch and a rear tamper switch so that it shall send a tamper alarm in the event that the transmitter's cover is removed, or if the transmitter is removed from its mounting surface. The model number of the wireless transmitter is the 5817CB or equivalent.

23. Wireless Receivers for Commercial Applications: Include Commercial Wireless Receivers where designated. The wireless receiver shall be UL Listed, Factory Mutual Approved, MEA Listed, and CSFM Listed for the application. The wireless receiver shall receive messages from wireless devices indicating device detection loop open, normal, shorted, tamper alarm, and low battery status when sent from transmitters associated with the system. Each wireless transmitter shall send periodic check-in signals to its associated control panel. The transmitter's associated control panel shall report any missing transmitter within four and one-half hours. Each transmitter shall report any low battery condition a minimum of seven days before its battery becomes too discharged to power the transmitter. The transmitter's associated control panel shall report any low battery condition by providing a local indication at system keypads, and shall send a trouble report to the central monitoring station. The model number of the receiver is Honeywell 5881ENHC or equivalent.
24. Wireless Repeaters for Commercial Applications: Include Commercial Wireless Repeaters where designated. The wireless repeater shall be UL Listed for the application. The wireless repeater shall receive and forward messages from wireless devices indicating device detection loop open, normal, shorted, tamper alarm, and low battery status when sent from transmitters associated with the system. Each wireless transmitter shall send periodic check-in signals to its associated control panel. The transmitter's associated control panel shall report any missing transmitter within four and one-half hours. Each transmitter shall report any low battery condition a minimum of seven days before its battery becomes too discharged to power the transmitter. The transmitter's associated control panel shall report any low battery condition by providing a local indication at system keypads, and shall send a trouble report to the central monitoring station. The model number of the repeater is Honeywell 58xxRPT or equivalent.
25. Interior Fire Horns: In the event of a fire alarm on the system, the control panel shall sound a System Sensor model BK-HR 12/24VDC Fire Horn or equivalent, that features a sound level of 67-77dB at 20 feet. The horn shall feature a polarized power input. If the siren is removed from the NAC circuit, the system shall send a supervisory report to the monitoring station. The Fire Horn shall be UL Listed, FM approved, CSFM listed and MEA listed for the application. The installer shall install the fire horn as directed by the manufacturer's installation instructions.
26. Wall Mounted, Multi-Candela Strobes Notification Appliances: In the event of a fire alarm on the system, the control panel shall activate a System Sensor model BK-SR Fire Strobe or equivalent, that features a candela setting specified between 15cd and 115cd. The strobe shall feature a polarized power input. If the strobe is removed from the NAC circuit, the system shall send a supervisory report to the monitoring station. The Fire strobe shall be UL

- Listed, FM approved, CSFM listed and MEA listed for the application. The installer shall install the fire strobe as directed by the manufacturer's installation instructions.
27. Wall Mounted, 4-Wire, Interior Fire Horn/Strobes: In the event of a fire alarm on the system, the control panel shall sound a System Sensor model P4R Fire Horn/Strobe or equivalent, that features a selectable light level between 15cd and 115cd. The Horn/Strobe shall feature a polarized power input. If the Horn/Strobe is removed from the NAC circuit, the system shall send a supervisory report to the monitoring station. The Fire Horn/Strobe shall be UL Listed, FM approved, CSFM listed and MEA listed for the application. The installer shall install the fire Horn/Strobe as directed by the manufacturer's installation instructions.
 28. Wall Mounted, 2-Wire, Interior Fire Horn/Strobes: In the event of a fire alarm on the system, the control panel shall sound a System Sensor model BK-P2R 12/24VDC Fire Horn/Strobe or equivalent, that features a selectable light level between 15cd and 115cd. The Horn/Strobe shall feature a polarized power input. If the Horn/Strobe is removed from the NAC circuit, the system shall send a supervisory report to the monitoring station. The Fire Horn/Strobe shall be UL Listed, FM approved, CSFM listed and MEA listed for the application. The installer shall install the fire Horn/Strobe as directed by the manufacturer's installation instructions.
 29. Ceiling Mounted, Multi-Candela Strobe Notification Appliances: In the event of a fire alarm on the system, the control panel shall activate a System Sensor model BK-SCR Fire Strobe or equivalent, that features a candela setting specified between 15cd and 115cd. The strobe shall feature a polarized power input. If the strobe is removed from the NAC circuit, the system shall send a supervisory report to the monitoring station. The Fire strobe shall be UL Listed, FM approved, CSFM listed and MEA listed for the application. The installer shall install the fire strobe as directed by the manufacturer's installation instructions.
 30. Ceiling Mounted, Indoor 4-Wire, Fire Horn/Strobes: In the event of a fire alarm on the system, the control panel shall sound an outdoor System Sensor model PC4R Fire Horn/Strobe or equivalent, that features a selectable light level between 15cd and 115cd. The Horn/Strobe shall feature a polarized power input. If the Horn/Strobe is removed from the NAC circuit, the system shall send a supervisory report to the monitoring station. The Fire Horn/Strobe shall be UL Listed, FM approved, CSFM listed and MEA listed for the application. The installer shall install the fire Horn/Strobe as directed by the manufacturer's installation instructions.
 31. Ceiling Mounted, Indoor 2-Wire, Fire Horn/Strobes: In the event of a fire alarm on the system, the control panel shall sound an outdoor System Sensor model PC2R Fire Horn/Strobe or equivalent, that features a selectable light level between 15cd and 115cd. The Horn/Strobe shall feature a polarized power input. If the Horn/Strobe is removed from the NAC circuit, the system shall send a supervisory report to the monitoring station. The Fire Horn/Strobe shall be UL Listed, FM approved, CSFM listed and MEA listed for the

- application. The installer shall install the fire Horn/Strobe as directed by the manufacturer's installation instructions.
32. Outdoor Fire Horns: In the event of a fire alarm on the system, the control panel shall sound a System Sensor model BK-HRK 12/24VDC Outdoor Fire Horn or equivalent, that features a sound level of 67-77dB at 20 feet. The horn shall feature a polarized power input. If the siren is removed from the NAC circuit, the system shall send a supervisory report to the monitoring station. The Fire Horn shall be UL Listed, FM approved, CSFM listed and MEA listed for the application. The installer shall install the fire horn as directed by the manufacturer's installation instructions.
 33. Wall Mounted, Multi-Candela Strobes Notification Appliances: In the event of a fire alarm on the system, the control panel shall activate a System Sensor model BK-SRK Outdoor Fire Strobe or equivalent, that features a candela setting specified between 15cd and 115cd. The strobe shall feature a polarized power input. If the strobe is removed from the NAC circuit, the system shall send a supervisory report to the monitoring station. The Fire strobe shall be UL Listed, FM approved, CSFM listed and MEA listed for the application. The installer shall install the fire strobe as directed by the manufacturer's installation instructions.
 34. Wall Mounted, Outdoor 4-Wire, Outdoor Fire Horn/Strobes: In the event of a fire alarm on the system, the control panel shall sound an outdoor System Sensor model P4RK Fire Horn/Strobe or equivalent, that features a selectable light level between 15cd and 115cd. The Horn/Strobe shall feature a polarized power input. If the Horn/Strobe is removed from the NAC circuit, the system shall send a supervisory report to the monitoring station. The Fire Horn/Strobe shall be UL Listed, FM approved, CSFM listed and MEA listed for the application. The installer shall install the fire Horn/Strobe as directed by the manufacturer's installation instructions.
 35. Wall Mounted, Outdoor 2-Wire, Outdoor Fire Horn/Strobes: In the event of a fire alarm on the system, the control panel shall sound an outdoor System Sensor model BK-P2RK Fire Horn/Strobe or equivalent, that features a selectable light level between 15cd and 115cd. The Horn/Strobe shall feature a polarized power input. If the Horn/Strobe is removed from the NAC circuit, the system shall send a supervisory report to the monitoring station. The Fire Horn/Strobe shall be UL Listed, FM approved, CSFM listed and MEA listed for the application. The installer shall install the fire Horn/Strobe as directed by the manufacturer's installation instructions.
 36. Ceiling Mounted, Outside, Multi-Candela Strobe Notification Appliances: In the event of a fire alarm on the system, the control panel shall activate a System Sensor model BK-SCRK Fire Strobe or equivalent, that features a candela setting specified between 15cd and 115cd. The strobe shall feature a polarized power input. If the strobe is removed from the NAC circuit, the system shall send a supervisory report to the monitoring station. The Fire strobe shall be UL Listed, FM approved, CSFM listed and MEA listed for the application. The installer shall install the fire strobe as directed by the manufacturer's installation instructions.

37. Ceiling Mounted, Outdoor 4-Wire, Fire Horn/Strobes: In the event of a fire alarm on the system, the control panel shall sound an outdoor System Sensor model PC4RK Fire Horn/Strobe or equivalent, that features a selectable light level between 15cd and 115cd. The Horn/Strobe shall feature a polarized power input. If the Horn/Strobe is removed from the NAC circuit, the system shall send a supervisory report to the monitoring station. The Fire Horn/Strobe shall be UL Listed, FM approved, CSFM listed and MEA listed for the application. The installer shall install the fire Horn/Strobe as directed by the manufacturer's installation instructions.
38. Ceiling Mounted, Indoor 2-Wire, Outdoor Fire Horn/Strobes: In the event of a fire alarm on the system, the control panel shall sound an outdoor System Sensor model BK- PC2RK Fire Horn/Strobe or equivalent, that features a selectable light level between 15cd and 115cd. The Horn/Strobe shall feature a polarized power input. If the Horn/Strobe is removed from the NAC circuit, the system shall send a supervisory report to the monitoring station. The Fire Horn/Strobe shall be UL Listed, FM approved, CSFM listed and MEA listed for the application. The installer shall install the fire Horn/Strobe as directed by the manufacturer's installation instructions.
39. HVAC Fan Shutdown: Include a connection to each HVAC Fan as required by UL, NFPA, and local building codes. The HVAC Fan shutdown trigger shall be connected to a 4101SN relay output module or equivalent.
40. Fire Alarm Integration with Access Controlled Doors: The system shall automatically unlock designated access controlled doors to ensure exit routes during fire alarm activations as recommended by UL, NFPA, and local building codes.
41. Keypad, Fire Annunciator LED Station: The system keypad shall include an LED Station. Use the Honeywell Vista FSA8 and FSA24 with the FSAKSM Key Station or equivalent. The installer shall follow manufacturer's installation instructions when installing system equipment.
42. Fire System Smoke Detectors with Heat Sensors: Selected areas in the facility will use Smoke detectors to sense the buildup of Smoke caused by fires and smoldering objects. The quantity and spacing of detectors shall meet those suggested by UL, NFPA and other recognized agencies and building codes. Locations for Smoke detectors may be in hallways, laboratories, server rooms, classrooms or other areas where required. For each Smoke detector, install a Honeywell 5192SDT Smoke detector.
43. Fire System Smoke Detectors, 2-Wire: Selected areas in the facility will use Smoke detectors to sense the buildup of Smoke caused by fires and smoldering objects. The quantity and spacing of detectors shall meet those suggested by UL, NFPA and other recognized agencies and building codes. Locations for Smoke detectors may be in hallways, laboratories, server rooms, classrooms or other areas where required. For each Smoke detector, install a System Sensor 2WB-T Smoke detector or equivalent.
44. Fire System Smoke Detectors, Thermal Sensor, 2-Wire: Selected areas in the facility will use Smoke detectors to sense the buildup of Smoke caused by fires and smoldering objects. The smoke detector shall also feature a spot heat

sensor rated at 135°F. The quantity and spacing of detectors shall meet those suggested by UL, NFPA and other recognized agencies and building codes. Locations for Smoke detectors may be in hallways, laboratories, server rooms, classrooms or other areas where required. For each Smoke detector, install a System Sensor 2WB-T Smoke detector or equivalent.

45. Fire System Smoke Detectors, 4-Wire: Selected areas in the facility will use Smoke detectors to sense the buildup of Smoke caused by fires and smoldering objects. The quantity and spacing of detectors shall meet those suggested by UL, NFPA and other recognized agencies and building codes. Locations for Smoke detectors may be in hallways, laboratories, server rooms, classrooms or other areas where required. For each Smoke detector, install a System Sensor 4WB-T Smoke detector or equivalent.
46. Fire System Heat Detectors, 194°F Fixed, V-Plex: Selected areas in the facility will use heat detectors to sense the sudden outbreak of fires. The quantity and spacing of detectors shall meet those suggested by UL, NFPA and other recognized agencies and building codes. Locations for Heat detectors may be in hallways, parking garages, utility rooms, laboratories, server rooms, classrooms or other areas where required. For each heat detector, install a System Sensor 5604 heat detector or equivalent.
47. Fire System Heat Detectors, 194°F Fixed, Wireless: Selected areas in the facility will use heat detectors to sense the sudden outbreak of fires. The quantity and spacing of detectors shall meet those suggested by UL, NFPA and other recognized agencies and building codes. Locations for Heat detectors may be in hallways, parking garages, utility rooms, laboratories, server rooms, classrooms or other areas where required. For each heat detector, install a System Sensor 5604 heat detector or equivalent.
48. Fire System Heat Detectors, 194°F Fixed and Rate of Rise, V-Plex: Selected areas in the facility will use heat detectors to sense the sudden outbreak of fires. The quantity and spacing of detectors shall meet those suggested by UL, NFPA and other recognized agencies and building codes. Locations for Heat detectors may be in hallways, parking garages, utility rooms, laboratories, server rooms, classrooms or other areas where required. For each heat detector, install a System Sensor 5604 heat detector or equivalent.
49. Fire System Heat Detectors, 194°F Fixed and Rate of Rise, Wireless: Selected areas in the facility will use heat detectors to sense the sudden outbreak of fires. The quantity and spacing of detectors shall meet those suggested by UL, NFPA and other recognized agencies and building codes. Locations for Heat detectors may be in hallways, parking garages, utility rooms, laboratories, server rooms, classrooms or other areas where required. For each heat detector, install a System Sensor 5604 heat detector or equivalent.
50. Fire System Heat Detectors, 135°F Fixed and Rate of Rise, V-Plex: Selected areas in the facility will use heat detectors to sense the sudden outbreak of fires. The quantity and spacing of detectors shall meet those suggested by UL, NFPA and other recognized agencies and building codes. Locations for Heat detectors may be in hallways, parking garages, utility rooms, laboratories,

- server rooms, classrooms or other areas where required. For each heat detector, install a System Sensor 5604 heat detector or equivalent.
51. Manual Pull Stations, Dual Action, Wireless: Include manual fire alarm stations near exits, stairwells, and other locations recommended by UL, NFPA, and local building codes. The manual pull station shall be the Honeywell Model 5140MPS-2 and a 4193SN zone input module or equivalent.
 52. Manual Pull Stations, Dual Action, Wireless: Include manual fire alarm stations near exits, stairwells, and other locations recommended by UL, NFPA, and local building codes. The manual pull station shall be the Honeywell Model 5140MPS-2 and a 5817CB Transmitter or equivalent.
 53. OS&Y Valves: Monitor tamper switches inside of OS&Y or other designated Fire Suppression System control valves. The OS&Y valve shall connect to a zone input module or a zone input on the FACP.
 54. OS&Y Valves, Wireless: Monitor tamper switches inside of OS&Y or other designated Fire Suppression System control valves. The OS&Y valve shall connect to a zone input module or a zone input on the FACP.
 55. Fire Alarm Supervisory Devices, V-Plex: Include a connection to each initiating device to supervise its idle, trouble, and alarm statuses as required by UL, NFPA, and local building codes. The fire supervisory device alarm and trouble outputs shall be connected to a 4193SN zone input module or equivalent.
 56. Fire Alarm Supervisory Devices, Wireless: Include a connection to each initiating device to supervise its idle, trouble, and alarm statuses as required by UL, NFPA, and local building codes. The fire supervisory device alarm and trouble outputs shall be connected to a 5817CB Wireless Transmitter or equivalent.
 57. Hood Fire Suppression, Wireless: Include a connection to each stove hood suppression alarm to supervise its charge and discharge statuses as required by UL, NFPA, and local building codes. The hood suppression system alarm and trouble outputs shall be connected to a 4193SN zone input module or equivalent.
 58. Combined AlarmNet-I (Internet) and AlarmNet-GSM (Global System for Mobile) Fire Alarm Communication: The facility system shall be monitored using both the AlarmNet-I and the AlarmNet-G Communication services. The system shall use Honeywell's AlarmNet IGSMCF Fire Alarm transmitter or equivalent. The communication service shall employ a two-way Internet connection through AlarmNet Communication Service as the primary method of communication, and then the two-way GPRS (General Packet Radio Service) as the secondary means of communication and shall use SMS (Short Message Service) as a tertiary means of communication. The equipment shall be UL listed for use in this application. The installer shall follow manufacturer's instructions when installing the AlarmNet unit.
 59. Fire Pump Diesel: Monitor the status of the Automatic Fire Suppression Water Pump Controller using zone inputs on the system.

60. Isolation for the ECP bus: Include an ECP-ISO isolation device or equivalent to protect fire Annunciators and communication devices from distant shorts or overloaded conditions on the ECP Bus.
61. Fire Alarm Initiating Devices: Include a connection to each initiating device to supervise its idle, trouble, and alarm statuses as required by UL, NFPA, and local building codes. The fire initiating device alarm and trouble outputs shall be connected to a 4193SN zone input module or equivalent.
62. VSI Bus Isolation and Integrity: System V-Plex bus branch circuits shall be isolated from one another so that a shorted, overloaded, or grounded branch circuit is isolated away from other near-side branch circuits, allowing undamaged V-Plex bus circuits to continue to operate. VSI Isolation modules shall be installed at near-side connections to cable runs leading to additional buildings, at cable runs leading to additional floors in multi-story buildings, and at junction boxes leading to multiple V-Plex branch circuits within the system. The installer shall use the Honeywell VSI module or equivalent.
63. Zone Input: System zone inputs allow the system to sense the change in state of an output from an external device, such as a door/window position sensor, a motion detector, a relay output from an appliance, the output of an external alert system, or other devices that provide a dry closure output.
64. Leak, Flood, Water Level: Monitor the level of water in a designated location. The installer shall install a Honeywell Model 470-12 Water Sensor or equivalent. The owner may monitor air conditioning duct drip pans, areas beneath water heaters and tanks, refrigeration drain basins, sump pumps, basements, or restrooms. The installer shall follow manufacturer instructions while installing and programming system equipment.
65. Hollow Steel Frame Doors: Monitor the opened and closed position of doors in the facility. The installer shall install a Honeywell Model 4191SN-WH Recessed 1/2" sensor, equipped with the steel door adapter or equivalent. The installer shall follow manufacturer instructions while installing and programming system equipment.
66. Filled Steel Frame Doors: Monitor the opened and closed position of doors in the facility. The installer shall install a Honeywell Model 960 Door sensor, and a 4193SN or equivalent. The installer shall follow manufacturer instructions while installing and programming system equipment.
67. Wood Frame Doors: Monitor the opened and closed position of doors in the facility. The installer shall install a Honeywell Model 4191SN-WH Recessed 1/2" sensor or equivalent. The installer shall follow manufacturer instructions while installing and programming system equipment.
68. Roof Hatches: Monitor the opened and closed position of hatches and access doors to the roof of the facility. The installer shall install a Honeywell Model 960 Armored Door Sensor, or equivalent. The installer shall follow manufacturer instructions while installing and programming system equipment.
69. Overhead Doors: Monitor the opened and closed position of overhead bay doors in the facility. The installer shall install a Honeywell Model 4959SN Overhead Door sensor, or equivalent. The installer shall follow manufacturer instructions while installing and programming system equipment.

70. Temperature Threshold Detector: Selected areas in the facility will use Temperature Threshold detectors to sense high or low level temperatures within a designated area. Locations for Temperature Threshold detectors may be in kitchens, laboratories, server rooms, classrooms or other areas where temperature threshold notification is critical. For each Temperature Threshold detector, install a Honeywell zone input module and a Honeywell TS300 Temperature Threshold detector or equivalent, and an appropriate power supply.
71. Carbon Monoxide Detector, V-Plex: Selected areas in the facility will use carbon monoxide detectors to sense high levels of carbon monoxide. Locations for carbon monoxide detectors may be in parking garages, kitchens, laboratories, near fireplaces, or in natural gas fueled heater closets. For each carbon monoxide detector, install a Honeywell 4193SN zone input module and a System Sensor CO1224 Carbon Monoxide detector or equivalent, and an appropriate power supply.
72. Natural Gas Detector: Selected areas in the facility will use natural gas detectors to sense high levels of natural gas. Locations for natural gas detectors may be in kitchens, laboratories, near fireplaces, or in natural gas fueled heater closets. For each natural gas detector, install a Honeywell zone input module and a Pama DW-200012UL natural gas detector or equivalent, and an appropriate power supply.
73. Glass Break Detector, V-Plex: Selected areas in the protected site will use glass-break detectors to sense the breaking of windows. Where designated in the plans, install a Honeywell Model FG1625SN Glass Break detector or equivalent. The installer shall follow manufacturer's instructions when installing, testing and programming system equipment.
74. Dual-Tec Motion Detector, Wall-Mounted, V-Plex: Selected areas in the protected site will use motion detectors to sense motion in rooms or areas of rooms. Where designated in the plans, install a Honeywell Model DT7500SN V-Plex Dual-Tec Motion Detector or equivalent.
75. Passive Infrared Motion Detector, Ceiling-mounted, V-Plex: Selected areas in the protected site will use motion detectors to sense motion in rooms or areas of rooms. Where designated in the plans, install a Honeywell Model IS280CM Ceiling Mounted Passive Infrared Motion Detector or equivalent.
76. Panic Buttons: Include manual panic buttons under desks, in storage rooms, in walk-in refrigeration units and other designated locations. The panic button shall be the Honeywell Model 269SN or equivalent.
77. Keypad, Alpha Display: The system keypad shall include a two-line, alphanumeric LCD display. Use the Honeywell Vista 6160 keypad or equivalent. The installer shall follow manufacturer's installation instructions when installing system equipment.
78. Keypad: Color Graphic Touch Screen Display: The system keypad shall employ a dynamic, interactive graphic touch screen display. Use the Honeywell Vista 6271C keypad or equivalent. The installer shall follow manufacturer's installation instructions when installing system equipment.

79. Keypad, Black and White Graphic Touch Screen Display: The system keypad shall employ a dynamic, interactive graphic touch screen display. Use the Honeywell Vista 6270 keypad or equivalent. The installer shall follow manufacturer's installation instructions when installing system equipment.
80. Keypad, Black and White Graphic Touch Screen Display with Voice Option: The system keypad shall employ a dynamic, interactive graphic touch screen display. Use the Honeywell Vista 6271V keypad or equivalent. The installer shall follow manufacturer's installation instructions when installing system equipment.
81. Automatic Door Locking: Selected doors in the facility will use system automatic door locking capabilities to restrict entry to into the facility, yet allow free exit by those who have completed their business. For each automatic locking door, install a 4101SN relay output module, a power supply, and an electric locking device.
82. Automatic Door Holders: Selected doors in the facility will use system automatic door holder capabilities to hold doors open until particular system events release the door. For each automatic locking door, install a 4101SN relay output module, a power supply, and an electric magnetic door holder device.
83. Energy Management: The system shall be connected to the central EMS system for the purposes of affecting the operation of heat and air conditioning appliances when the partition is armed.
84. Energy Management: The system shall be connected to each HVAC thermostat for the purposes of disabling heat and air conditioning appliances when the partition is armed.
85. Refrigeration Temperature Threshold Detector: Selected refrigeration units in the facility will use Temperature Threshold detectors to sense high temperature levels. Locations for Temperature Threshold detectors may be in kitchens, laboratories, For each Temperature Threshold detector, install a Honeywell 4193SN zone input module and a Honeywell TS300 Temperature Threshold detector or equivalent, and an appropriate power supply.
86. Optiflex Video Camera System: Include an integrated video system. Use the Honeywell Optiflex Network Video or equivalent. The Video system shall be capable of being displayed on suitable system keypads. The Video system shall be capable of being viewed from a distant network location by way of a browser, or by video software. The Video system shall provide up to six camera inputs and an NTSC video output. The Video system shall be capable of storing up to 19, 10-frame event clips that can be retrieved by way of software. The system shall not require the use of a DVR. The installer shall follow manufacturer's installation instructions when installing system equipment.
87. Wireless Door Sensors for Wood Jambs: Include Wireless Door Sensors for Wood Jamb Doors where designated. When the door is opened and closed, the wireless door sensor shall send messages indicating the state of the door to the control panel. Each wireless transmitter shall send periodic check-in signals to its associated control panel. The door sensor's associated control panel shall

report any missing door sensor within four and one-half hours. Each transmitter shall report any low battery condition a minimum of seven days before its battery becomes too discharged to power the transmitter. Each door sensor shall include an internal tamper switch, and shall send a tamper alert to the control panel when removed from its installed location. The transmitter's associated control panel shall report any low battery condition by providing a local indication at system keypads, and shall send a trouble report to the central monitoring station. The model number of the wireless door sensor is the 5818MN or equivalent.

88. Wireless Door Sensors for Hollow Metal Door Frames: Include Wireless Door Sensors for Hollow Metal Jamb Doors where designated. The when the door is opened and closed, the wireless door sensor shall send messages indicating the state of the door to the control panel. Each wireless transmitter shall send periodic check-in signals to its associated control panel. The door sensor's associated control panel shall report any missing door sensor within four and one-half hours. Each transmitter shall report any low battery condition a minimum of seven days before its battery becomes too discharged to power the transmitter. Each door sensor shall include an internal tamper switch, and shall send a tamper alert to the control panel when removed from its installed location. The transmitter's associated control panel shall report any low battery condition by providing a local indication at system keypads, and shall send a trouble report to the central monitoring station. The model number of the door sensor is the 947-75 and the 5816 Wireless transmitter or equivalent.
89. Wireless Door Sensors for Hollow Metal Door Frames: Include Wireless Door Sensors for Hollow Metal Jamb Doors where designated. The when the door is opened and closed, the wireless door sensor shall send messages indicating the state of the door to the control panel. Each wireless transmitter shall send periodic check-in signals to its associated control panel. The door sensor's associated control panel shall report any missing door sensor within four and one-half hours. Each transmitter shall report any low battery condition a minimum of seven days before its battery becomes too discharged to power the transmitter. Each door sensor shall include an internal tamper switch, and shall send a tamper alert to the control panel when removed from its installed location. The transmitter's associated control panel shall report any low battery condition by providing a local indication at system keypads, and shall send a trouble report to the central monitoring station. The model number of the door sensor is the 947-75 and the 5816 Wireless transmitter or equivalent.
90. Wireless Door Sensors for Roof Hatches: Include Wireless Door Sensors for Roof Hatches where designated. The when the door is opened and closed, the wireless door sensor shall send messages indicating the state of the door to the control panel. Each wireless transmitter shall send periodic check-in signals to its associated control panel. The door sensor's associated control panel shall report any missing door sensor within four and one-half hours. Each transmitter shall report any low battery condition a minimum of seven days before its battery becomes too discharged to power the transmitter. Each wireless transmitter shall include an internal tamper switch, a back tamper switch, and

shall send a tamper alert to the control panel when removed from its installed location, or when opened. The transmitter's associated control panel shall report any low battery condition by providing a local indication at system keypads, and shall send a trouble report to the central monitoring station. The model number of the door sensor is the Ademco 960 and the 5816 Wireless transmitter or equivalent.

91. Wireless Door Sensors for Overhead Rollup Doors: Include Wireless Door Sensors for Overhead Rollup Doors where designated. The when the door is opened and closed, the wireless door sensor shall send messages indicating the state of the door to the control panel. Each wireless transmitter shall send periodic check-in signals to its associated control panel. The door sensor's associated control panel shall report any missing door sensor within four and one-half hours. Each transmitter shall report any low battery condition a minimum of seven days before its battery becomes too discharged to power the transmitter. Each wireless transmitter shall include an internal tamper switch, a back tamper switch, and shall send a tamper alert to the control panel when removed from its installed location, or when opened. The transmitter's associated control panel shall report any low battery condition by providing a local indication at system keypads, and shall send a trouble report to the central monitoring station. The model number of the door sensor is the Ademco 957 and the 5816 Wireless transmitter or equivalent.
92. Dual-Tec Motion Detector, Wall-mounted, Wireless: Selected areas in the protected site will use motion detectors to sense motion in rooms or areas of rooms. Where designated in the plans, install a Honeywell Model 5897-35 Wireless Motion Detector or equivalent.
93. Glass Break Detector, Wireless: Selected areas in the protected site will use glass-break detectors to sense the breaking of windows. Where designated in the plans, install a Honeywell Model 5853 Glass Break detector or equivalent. The installer shall follow manufacturer's instructions when installing, testing and programming system equipment.
94. Wireless Panic Button: Include Wireless Panic Button at designated locations. The when the Panic Button is triggered into alarm, the wireless transmitter shall send a message to the control panel. Each wireless Panic Button shall send periodic check-in signals to its associated control panel. The Panic Button's associated control panel shall report any missing Panic Button within four and one-half hours. Each Panic Button shall report any low battery condition a minimum of seven days before its battery becomes too discharged to power the transmitter. The Panic Button's associated control panel shall report any low battery condition by providing a local indication at system keypads, and shall send a trouble report to the central monitoring station. The wireless Panic Button shall include a cover tamper switch and a rear tamper switch so that it shall send a tamper alarm in the event that the Panic Button's cover is removed, or if the Panic Button is removed from its mounting surface. The model number of the wireless Panic Button is the 5853 or equivalent.
95. Vibration Sensors: Include Vibration Sensors where designated. When the sensor detects vibration, the sensor shall send messages indicating the fault to

the control panel. Each vibration sensor shall report a trouble condition if disconnected from its zone expander. The model number of the vibration sensor is the Ademco 11 and a or equivalent.

96. Wireless Receivers for Commercial Applications: Include Commercial Wireless Receivers where designated. The wireless receiver shall be UL Listed, Factory Mutual Approved, MEA Listed, and CSFM Listed for the application. The wireless receiver shall receive messages from wireless devices indicating device detection loop open, normal, shorted, tamper alarm, and low battery status when sent from transmitters associated with the system. Each wireless transmitter shall send periodic check-in signals to its associated control panel. The transmitter's associated control panel shall report any missing transmitter within four and one-half hours. Each transmitter shall report any low battery condition a minimum of seven days before its battery becomes too discharged to power the transmitter. The transmitter's associated control panel shall report any low battery condition by providing a local indication at system keypads, and shall send a trouble report to the central monitoring station. The model number of the receiver is Honeywell 5881ENHC or equivalent.
97. Wireless Repeaters for Commercial Applications: Include Commercial Wireless Repeaters where designated. The wireless repeater shall be UL Listed for the application. The wireless repeater shall receive and forward messages from wireless devices indicating device detection loop open, normal, shorted, tamper alarm, and low battery status when sent from transmitters associated with the system. Each wireless transmitter shall send periodic check-in signals to its associated control panel. The transmitter's associated control panel shall report any missing transmitter within four and one-half hours. Each transmitter shall report any low battery condition a minimum of seven days before its battery becomes too discharged to power the transmitter. The transmitter's associated control panel shall report any low battery condition by providing a local indication at system keypads, and shall send a trouble report to the central monitoring station. The model number of the repeater is Honeywell 58xxRPT or equivalent.
98. Wood Doors and Windows, Exposed, V-Plex: Monitor the opened and closed position of doors and windows in the facility. The installer shall install a Honeywell Model 4939SN Exposed Addressable Sensor, or equivalent. The installer shall follow manufacturer instructions while installing and programming system equipment.
99. Wood Frame Doors and Windows, Exposed, Wireless: Monitor the opened and closed position of doors in the facility. The installer shall install a Honeywell Model 7939WG Exposed Door Sensor, or equivalent. The installer shall follow manufacturer instructions while installing and programming system equipment.
100. Hatch Doors, Exposed, V-Plex: Monitor the opened and closed position of doors in the facility. The installer shall install a Honeywell Model 4939SN Exposed Addressable Sensor, or equivalent. The installer shall follow manufacturer instructions while installing and programming system equipment.

Project Date:
Project ID:
Project Name:

SECTION 283113
INTRUSION DETECTION AND FIRE ALARM PANELS

101. Hatch Doors, Exposed, Wireless: Monitor the opened and closed position of hatches in the facility. The installer shall install a Honeywell Model 7939WG Exposed Sensor, or equivalent. The installer shall follow manufacturer instructions while installing and programming system equipment.
102. Energy Management and Remote Control by Telephone: The system shall be connected to each HVAC thermostat for the purposes of disabling heat and air conditioning appliances when the partition is armed. Using the 4500 Thermostat Interface and the 4286 Phone module, the system shall allow users to call the protected site and make adjustments to the temperature of the building.
103. Filled Metal Doors and Windows, Exposed, V-Plex: Monitor the opened and closed position of doors and windows in the facility. The installer shall install a Honeywell Model 4939SN Exposed Addressable Sensor, or equivalent. The installer shall follow manufacturer instructions while installing and programming system equipment.
104. Filled Metal Frame Doors and Windows, Wireless: Monitor the opened and closed position of doors and windows in the facility. The installer shall install a Honeywell Model 7939WG Exposed sensor, or equivalent. The installer shall follow manufacturer instructions while installing and programming system equipment.
105. Hollow Metal Doors and Windows, Exposed, V-Plex: Monitor the opened and closed position of doors and windows in the facility. The installer shall install a Honeywell Model 4939SN Exposed Addressable Sensor, or equivalent. The installer shall follow manufacturer instructions while installing and programming system equipment.
106. Server Room Alert Systems : The system shall be provide sensing of critical conditions within the server room. The system shall alert the user when the temperature is too high, when the humidity is too high, when air conditioning condensation drip pans require draining and when there is an extended power failure.
107. Kitchen Alert Systems : The system shall be provide sensing of critical conditions within the kitchen or food processing facility. The system shall alert the user when the temperature is too high, when the humidity is too high, when air conditioning condensation drip pans require draining and when there is an extended power failure.
108. Natural Gas Detector: Selected areas in the facility will use natural gas detectors to sense high levels of natural gas. Locations for natural gas detectors may be in kitchens, laboratories, near fireplaces, or in natural gas fueled heater closets. For each natural gas detector, install a Honeywell zone input module and a Pama DW-200012UL natural gas detector or equivalent, and an appropriate power supply.
109. Safe or Vault Protection: Monitor the status of the Safe. For each Safe, the installer shall provide complete protection integrated with the system.
110. Vending Machine Protection: Monitor the status of the Vending Machine. For each Vending Machine, the installer shall provide complete protection integrated with the system.

111. Gas Water Heater Alert Systems : The system shall be provide sensing of critical conditions within the water heater room. The system shall alert the user in the event of natural gas leaks, carbon monoxide presence, and in the event of water leaks.
112. Photo Beam, 100 Feet, V-Plex: Monitor the status of photo beam units installed in the facility. The installer shall install a Honeywell Model CK-IB100D Photo Beam Sensor, or equivalent. The installer shall follow manufacturer instructions while installing and programming system equipment.
113. Photo Beam, 250 Feet, V-Plex: Monitor the status of photo beam units installed in the facility. The installer shall install a Honeywell Model CK-IB250S Photo Beam Sensor, or equivalent. The installer shall follow manufacturer instructions while installing and programming system equipment.
114. Hollow Metal Frame Doors and Windows, Exposed, Wireless: Monitor the opened and closed position of doors and windows in the facility. The installer shall install a Honeywell Model 7939WG Exposed Sensor, or equivalent. The installer shall follow manufacturer instructions while installing and programming system equipment.
115. Hollow Metal Frame Doors and Windows, Exposed, Armored, V-Plex: Monitor the opened and closed position of doors and windows in the facility. The installer shall install a Honeywell Model 960 Armored Door Sensor, or equivalent. The installer shall follow manufacturer instructions while installing and programming system equipment.
116. Wood Frame Doors and Windows, Exposed, Armored, V-Plex: Monitor the opened and closed position of doors and windows in the facility. The installer shall install a Honeywell Model 960 Armored Door Sensor, or equivalent. The installer shall follow manufacturer instructions while installing and programming system equipment.
117. Passive Infrared Motion Detector, Wall-Mounted, Wireless: Selected areas in the protected site will use motion detectors to sense motion in rooms or areas of rooms. Where designated in the plans, install a Honeywell Model 5890 Wireless Motion Detector or equivalent.
118. Passive Infrared Motion Detector, Ceiling-Mounted, V-Plex: Selected areas in the protected site will use motion detectors to sense motion in rooms or areas of rooms. Where designated in the plans, install a Honeywell Model 997 Passive Infrared Motion Detector or equivalent.
119. Passive Infrared Motion Detector, Wall-Mounted, V-Plex: Selected areas in the protected site will use motion detectors to sense motion in rooms or areas of rooms. Where designated in the plans, install a Honeywell Model S2500SN V-Plex PIR Motion Detector or equivalent.
120. Dual-Tec Motion Detector, Wall-Mounted, Curtain, Wireless: Selected areas in the protected site will use motion detectors to sense motion in rooms or areas of rooms. Where designated in the plans, install a Honeywell Model 5897-35 Wireless Motion Detector or equivalent.
121. Dual-Tec Motion Detector, Anti-Mask, Wall-Mounted, V-Plex: Selected areas in the protected site will use motion detectors to sense motion in rooms or areas of rooms. Where designated in the plans, install a Honeywell Model DT-

- 906 Dual-Tec Motion Detector or equivalent with anti-mask detection capabilities.
122. Glass Break Detector, Flush Mount, V-Plex: Selected areas in the protected site will use glass-break detectors to sense the breaking of windows. Where designated in the plans, install a Honeywell Model FG1625F Flush-mount Glass Break detector or equivalent. The installer shall follow manufacturer's instructions when installing, testing and programming system equipment.
 123. Glass Break Detector, V-Plex, Flush-Mounted, Concealed: Selected areas in the protected site will use concealed glass-break detectors to sense the breaking of windows. Where designated in the plans, install a Honeywell Model FG1625RFM Glass Break detector or equivalent. The installer shall follow manufacturer's instructions when installing, testing and programming system equipment.
 124. Holdup Device, Bill Trap, V-Plex: Include Bill Trap Devices inside of money drawers in the checkout stand. The Bill trap devices be the Honeywell Model 264 or equivalent.
 125. Holdup Device: Bill Trap, Wireless: Include Bill Trap Devices inside of money drawers in the checkout stand. The Bill trap devices be the Honeywell Model 264 or equivalent.
 126. Holdup Device, Foot Rail, V-Plex: Include Foot Rail Devices on the floor below the customer service station or below designated desks within the protected location. The Foot Rail devices be the Honeywell Model 266 or equivalent.
 127. Holdup Device, Foot Rail, Wireless: Include Foot Rail Devices on the floor below the customer service station or below designated desks within the protected location. The Foot Rail devices be the Honeywell Model 266 or equivalent.
 128. Wireless Panic Button: Include Wireless Panic Button at designated locations. The when the Panic Button is triggered into alarm, the wireless transmitter shall send a message to the control panel. Each wireless Panic Button shall send periodic check-in signals to its associated control panel. The Panic Button's associated control panel shall report any missing Panic Button within four and one-half hours. Each Panic Button shall report any low battery condition a minimum of seven days before its battery becomes too discharged to power the transmitter. The Panic Button's associated control panel shall report any low battery condition by providing a local indication at system keypads, and shall send a trouble report to the central monitoring station. The wireless Panic Button shall include a cover tamper switch and a rear tamper switch so that it shall send a tamper alarm in the event that the Panic Button's cover is removed, or if the Panic Button is removed from its mounting surface. The model number of the wireless Panic Button is the 5802MN2 2-button panic transmitter or equivalent.
 129. Siren, Outdoor, High Output in Enclosure: Monitor the status of protected openings and areas in the armed and disarmed state. When an audible alarm occurs, the system shall sound a Honeywell Model 702 Siren or equivalent

- inside of the Model 743BE Enclosure. The installer shall install the siren as directed by manufacturer instructions.
130. Siren Enclosure, Outdoor, Large: For large sirens, the system shall be mounted inside of the Model 743BE Enclosure. The installer shall install the siren as directed by manufacturer instructions.
 131. Siren Indoor/Outdoor in Enclosure: Monitor the status of protected openings and areas in the armed and disarmed state. When an audible alarm occurs, the system shall sound a Honeywell Model 719 Siren or equivalent located inside a 742BE Enclosure. The installer shall install the siren as directed by manufacturer instructions.
 132. Siren Enclosure Indoor/Outdoor: 719 Sirens shall be enclosed in a 742BE Enclosure. The installer shall install the siren as directed by manufacturer instructions.
 133. Siren Indoor/Outdoor: Monitor the status of protected openings and areas in the armed and disarmed state. When an audible alarm occurs, the system shall sound a Honeywell Model 748LC Siren or equivalent. The installer shall install the siren as directed by manufacturer instructions.
 134. Siren Indoor, Wireless: Monitor the status of protected openings and areas in the armed and disarmed state. When an audible alarm occurs, the system shall sound a Honeywell Model 5800WAVE Wireless Siren or equivalent. The installer shall install the siren as directed by manufacturer instructions.
 135. Siren Indoor: Monitor the status of protected openings and areas in the armed and disarmed state. When an audible alarm occurs, the system shall sound a Honeywell Model Wave2 Siren or equivalent. The installer shall install the siren as directed by manufacturer instructions.
 136. Siren Indoor, Flush Mount: Monitor the status of protected openings and areas in the armed and disarmed state. When an audible alarm occurs, the system shall sound a Honeywell Model Wave2F Siren or equivalent. The installer shall install the siren as directed by manufacturer instructions.
 137. Strobe, Indoor/Outdoor: Monitor the status of protected openings and areas in the armed and disarmed state. When an alarm occurs, the system shall indicate the alarm with a Honeywell Model 710 Strobe or equivalent. The installer shall install the strobe as directed by manufacturer instructions.
 138. Leak, Flood, Water Level, Wireless: Monitor the level of water in a designated location. The installer shall install a Honeywell Model 5821 Water Sensor with a 470PB remote probe or equivalent. The owner may monitor air conditioning duct drip pans, areas beneath water heaters and tanks, refrigeration drain basins, sump pumps, basements, or restrooms. The installer shall follow manufacturer instructions while installing and programming system equipment.
 139. Temperature Threshold Detector, Wireless: Selected areas in the facility will use Temperature Threshold detectors to sense high or low level temperatures within a designated area. Locations for Temperature Threshold detectors may be in kitchens, laboratories, server rooms, classrooms or other areas where temperature threshold notification is critical. For each Temperature Threshold detector, install a Honeywell 5821 wireless temperature alarm transmitter and a Honeywell TS280R Temperature probe or equivalent.

140. Carbon Monoxide Detector, Wireless: Selected areas in the facility will use carbon monoxide detectors to sense high levels of carbon monoxide. Locations for carbon monoxide detectors may be in parking garages, kitchens, laboratories, near fireplaces, or in natural gas fueled heater closets. For each carbon monoxide detector, install a System Sensor CO1224 Carbon Monoxide detector or equivalent, and an appropriate power supply.
141. Holdup Device: Two-button, Conventional: Include Two-button Holdup Devices at customer windows. The holdup devices shall be the Honeywell Model 268 two-button holdup button or equivalent.
142. Asset Protection, Wireless: Selected indoor assets within the protected site will use wireless indoor asset protection devices to sense protected object Asset Protection. Where designated in the plans, install a Honeywell Model 5870API Wireless Asset Detector or equivalent.
143. Outdoor Passive Infrared Motion Detector, Wall, Post, or Pole-mounted, Wireless: Selected outdoor areas in the protected site will use outdoor motion detectors to sense motion. Where designated in the plans, install a Honeywell Model 5800PIR-OD Wireless Motion Detector or equivalent.
144. Premium Keypad, Alpha Display: The system keypad shall include a two-line, reverse display alphanumeric LCD display. Use the Honeywell Vista 6460 keypad or equivalent. The installer shall follow manufacturer's installation instructions when installing system equipment.
145. Portrait-style Keypad, Alpha Display: The system keypad shall include a two-line, reverse display alphanumeric LCD display. Use the Honeywell Vista 6165EX Portrait-style keypad or equivalent. The installer shall follow manufacturer's installation instructions when installing system equipment.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Examine site conditions prior to installation. Notify Architect and Owner in writing if unsuitable conditions are encountered. Do not start installation until site conditions are acceptable.

3.2 INSTALLATION

- A. Intrusion detection and fire alarm control panel system shall be installed and tested in accordance with manufacturer's installation instructions.
 1. Coordinate interfaces with Owner's representative where appropriate.
 2. Provide backboxes, pullboxes, connectors, supports, conduit, cable, and wire for a complete and reliable installation. Obtain Owner's approval for exact location of all boxes, conduit, and wiring runs prior to installation.
 3. Install conduit, cable, and wire parallel and square with building lines, including raised floors areas. Do not exceed forty percent fill in conduits. Gather wires and tie to create an orderly installation.
 4. Coordinate with other trades to provide proper sequencing of installation.

Project Date:
Project ID:
Project Name:

SECTION 283113
INTRUSION DETECTION AND FIRE ALARM PANELS

3.3 FIELD COMMISSIONING AND CERTIFICATION

- A. Field Commissioning: Test system as recommended by manufacturer, including the following:
 - 1. Conduct complete inspection and testing of equipment, including verification of operation with connected equipment.
 - 2. Test devices and demonstrate operational features for Owner's representative and authorities having jurisdiction as applicable.
 - 3. Correct deficiencies until satisfactory results are obtained.
 - 4. Submit written copies of test results.

3.4 TRAINING

- A. Conduct on-site system training, with the number of sessions and length of sessions as recommended by the manufacturer. Training shall include administration, provisioning, configuration, operation and diagnostics.

END OF SECTION.

SECTION 260543 - UNDERGROUND DUCTS AND RACEWAYS FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Direct-buried conduit, ducts, and duct accessories.
2. Concrete-encased conduit, ducts, and duct accessories.
3. Handholes and boxes.
4. Manholes.

1.2 ACTION SUBMITTALS

A. Product Data: For ducts and conduits, duct-bank materials, manholes, handholes, and boxes, and their accessories.

B. Shop Drawings:

1. Precast or Factory-Fabricated Underground Utility Structures:
 - a. Include plans, elevations, sections, details, attachments to other work, and accessories.
 - b. Include duct entry provisions, including locations and duct sizes.
 - c. Include reinforcement and joint details, frame and cover design, and manhole frame support rings.
2. Factory-Fabricated Handholes and Boxes Other Than Precast Concrete:
 - a. Include dimensioned plans, sections, elevations, accessory locations, and fabrication and installation details.
 - b. Include duct entry provisions, including locations and duct sizes.

1.3 INFORMATIONAL SUBMITTALS

- A. Duct-Bank Coordination Drawings: Show duct profiles, locations of expansion fittings, and coordination with other utilities and underground structures on Drawings signed and sealed by a qualified professional engineer.
- B. Product Certificates: For concrete and steel used in precast concrete handholes, as required by ASTM C 858.
- C. Qualification Data: For professional engineer and testing agency responsible for testing nonconcrete handholes and boxes.
- D. Source quality-control reports.

- E. Field quality-control reports.

1.4 QUALITY ASSURANCE

- A. Testing Agency Qualifications: Qualified according to ASTM E 329 for testing indicated.

1.5 FIELD CONDITIONS

- A. Interruption of Existing Electrical Service: Do not interrupt electrical service to facilities occupied by Owner or others unless permitted by Architect, Construction Manager, and/or Owner, and then only after arranging to provide temporary electrical service.
- B. Ground Water: Assume ground-water level is 36 inches (900 mm) below ground surface unless a higher water table is noted on Drawings.

PART 2 - PRODUCTS

2.1 GENERAL REQUIREMENTS FOR DUCTS AND RACEWAYS

- A. Comply with ANSI C2.

2.2 CONDUIT

- A. Rigid Steel Conduit: Galvanized. Comply with ANSI C80.1.
- B. RNC: NEMA TC 2, Type EPC-40-PVC, UL 651, with matching fittings by same manufacturer as the conduit, complying with NEMA TC 3 and UL 514B.

2.3 NONMETALLIC DUCTS AND DUCT ACCESSORIES

- A. Underground Plastic Utilities Duct: NEMA TC 2, UL 651, ASTM F 512, Type EPC-80, with matching fittings complying with NEMA TC 3 by same manufacturer as the duct.
- B. Duct Accessories:
 - 1. Duct Separators: Factory-fabricated rigid PVC interlocking spacers.
 - 2. Warning Tape: Underground-line warning tape specified in Section 260553 "Identification for Electrical Systems."
 - 3. Concrete Warning Planks: Nominal 12 by 24 by 3 inches (300 by 600 by 75 mm) in size, manufactured from 6000-psi (41-MPa) red concrete and labeled "ELECTRIC."

2.4 PRECAST CONCRETE HANDHOLES AND BOXES

- A. Comply with ASTM C 858 for design and manufacturing processes.

- B. Description: Factory-fabricated, reinforced-concrete, monolithically poured walls and bottom unless open-bottom enclosures are indicated. Frame and cover shall form top of enclosure and shall have load rating consistent with that of handhole or box.
1. Frame and Cover: Weatherproof cast-iron frame, with cast-iron cover with recessed cover hook eyes and tamper-resistant, captive, cover-securing bolts.
 2. Cover Finish: Nonskid finish shall have a minimum coefficient of friction of 0.50.
 3. Cover Legend: Molded lettering, "ELECTRIC."
 4. Configuration: Units shall be designed for flush burial and have closed bottom unless otherwise indicated.
 5. Extensions and Slabs: Designed to mate with bottom of enclosure. Same material as enclosure.
 - a. Extension shall provide increased depth of 12 inches (300 mm).
 - b. Slab: Same dimensions as bottom of enclosure, and arranged to provide closure.
 6. Joint Sealant: Asphaltic-butyl material with adhesion, cohesion, flexibility, and durability properties necessary to withstand maximum hydrostatic pressures at the installation location with the ground-water level at grade.
 7. Windows: Precast, reinforced openings in walls, arranged to match dimensions and elevations of approaching ducts and duct banks, plus an additional 12 inches (300 mm) vertically and horizontally to accommodate alignment variations.
 8. Duct Entrances in Handhole Walls: Cast end-bell or duct-terminating fitting in wall for each entering duct.
 9. Handholes 12 inches wide by 24 inches long (300 mm wide by 600 mm long) and larger shall have inserts for cable racks and pulling-in irons installed before concrete is poured.

2.5 HANDHOLES AND BOXES OTHER THAN PRECAST CONCRETE

- A. General Requirements for Handholes and Boxes: Comply with SCTE 77. Comply with tier requirements in "Underground Enclosure Application" Article.
1. Color: Gray.
 2. Configuration: Units shall be designed for flush burial and have closed bottom unless otherwise indicated.
 3. Cover: Weatherproof, secured by tamper-resistant locking devices and having structural load rating consistent with enclosure.
 4. Cover Finish: Nonskid finish shall have a minimum coefficient of friction of 0.50.
 5. Cover Legend: Molded lettering, "ELECTRIC."
 6. Handholes 12 inches wide by 24 inches long (300 mm wide by 600 mm long) and larger shall have factory-installed inserts for cable racks and pulling-in irons.
- B. Fiberglass Handholes and Boxes: Molded of fiberglass-reinforced polyester resin, with covers made of polymer concrete.
- C. High-Density Plastic Boxes: Injection molded of high-density polyethylene or copolymer-polypropylene. Cover shall be made of polymer concrete.

PART 3 - EXECUTION

3.1 UNDERGROUND DUCT APPLICATION

- A. Ducts for Electrical Cables More than 600 V: RNC, NEMA Type EPC-80, in concrete-encased duct bank unless otherwise indicated.
- B. Ducts for Electrical Feeders 600 V and Less: RNC, NEMA Type EPC-40-PVC, in direct-buried duct bank unless otherwise indicated.
- C. Ducts for Electrical Branch Circuits: RNC, NEMA Type EPC-40-PVC, in direct-buried duct bank unless otherwise indicated.
- D. Underground Ducts Crossing Driveways, Roadways, and Railroads: RNC, NEMA Type EPC-40-PVC, encased in reinforced concrete.

3.2 UNDERGROUND ENCLOSURE APPLICATION

- A. Handholes and Boxes for 600 V and Less:
 - 1. Units in Roadways and Other Deliberate Traffic Paths: Precast concrete. AASHTO HB 17, H-10 structural load rating.
 - 2. Units in Driveway, Parking Lot, and Off-Roadway Locations, Subject to Occasional, Nondeliberate Loading by Heavy Vehicles: Precast concrete, AASHTO HB 17, H-20 structural load rating.
 - 3. Units in Sidewalk and Similar Applications with a Safety Factor for Nondeliberate Loading by Vehicles: Polymer concrete units, SCTE 77, Tier 8 structural load rating.
 - 4. Units Subject to Light-Duty Pedestrian Traffic Only: Fiberglass-reinforced polyester resin, structurally tested according to SCTE 77 with 3000-lbf (13 500-N) vertical loading.
 - 5. Cover design load shall not exceed the design load of the handhole or box.

3.3 EARTHWORK

- A. Excavation and Backfill: Comply with Section 312000 "Earth Moving," but do not use heavy-duty, hydraulic-operated, compaction equipment.
- B. Restore areas disturbed by trenching, storing of dirt, cable laying, and other work. Restore vegetation and include necessary topsoiling, fertilizing, liming, seeding, sodding, sprigging, and mulching. Comply with Section 329200 "Turf and Grasses" and Section 329300 "Plants."
- C. Cut and patch existing pavement in the path of underground ducts and utility structures according to the "Cutting and Patching" Article in Section 017300 "Execution."

3.4 DUCT INSTALLATION

- A. Install ducts according to NEMA TCB 2.

- B. Slope: Pitch ducts a minimum slope of 1:300 down toward manholes and handholes and away from buildings and equipment. Slope ducts from a high point in runs between two manholes, to drain in both directions.
- C. Curves and Bends: Use 5-degree angle couplings for small changes in direction. Use manufactured long sweep bends with a minimum radius of 48 inches (1200 mm), both horizontally and vertically, at other locations unless otherwise indicated.
- D. Joints: Use solvent-cemented joints in ducts and fittings and make watertight according to manufacturer's written instructions. Stagger couplings so those of adjacent ducts do not lie in same plane.
- E. Installation Adjacent to High-Temperature Steam Lines: Where duct banks are installed parallel to underground steam lines, perform calculations showing the duct bank will not be subject to environmental temperatures above 40 deg?C. Where environmental temperatures are calculated to rise above 40 deg?C, and anywhere the duct bank crosses above an underground steam line, install insulation blankets listed for direct burial to isolate the duct bank from the steam line.
- F. Duct Entrances to Manholes and Concrete and Polymer Concrete Handholes: Use end bells, spaced approximately 10 inches (250 mm) o.c. for 5-inch (125-mm) ducts, and vary proportionately for other duct sizes.
 - 1. Begin change from regular spacing to end-bell spacing 10 feet (3 m) from the end bell without reducing duct line slope and without forming a trap in the line.
 - 2. Direct-Buried Duct Banks: Install an expansion and deflection fitting in each conduit in the area of disturbed earth adjacent to manhole or handhole. Install an expansion fitting near the center of all straight line direct-buried duct banks with calculated expansion of more than 3/4 inch (19 mm).
 - 3. Grout end bells into structure walls from both sides to provide watertight entrances.
- G. Building Wall Penetrations: Make a transition from underground duct to rigid steel conduit at least 10 feet (3 m) outside the building wall, without reducing duct line slope away from the building, and without forming a trap in the line. Use fittings manufactured for duct-to-conduit transition. Install conduit penetrations of building walls as specified in Section 260544 "Sleeves and Sleeve Seals for Electrical Raceways and Cabling."
- H. Sealing: Provide temporary closure at terminations of ducts that have cables pulled. Seal spare ducts at terminations. Use sealing compound and plugs to withstand at least 15-psig (1.03-MPa) hydrostatic pressure.
- I. Pulling Cord: Install 100-lbf- (450-N-) test nylon cord in empty ducts.
- J. Concrete-Encased Ducts: Support ducts on duct separators.
 - 1. Excavate trench bottom to provide firm and uniform support for duct bank. Prepare trench bottoms as specified in Section 312000 "Earth Moving" for pipes less than 6 inches (150 mm) in nominal diameter.
 - 2. Depth: Install top of duct bank at least 24 inches (600 mm) below finished grade in areas not subject to deliberate traffic, and at least 30 inches (750 mm) below finished grade in deliberate traffic paths for vehicles unless otherwise indicated.

3. Support ducts on duct separators coordinated with duct size, duct spacing, and outdoor temperature.
4. Separator Installation: Space separators close enough to prevent sagging and deforming of ducts, with not less than **four** spacers per 20 feet (6 m) of duct. Secure separators to earth and to ducts to prevent floating during concreting. Stagger separators approximately 6 inches (150 mm) between tiers. Tie entire assembly together using fabric straps; do not use tie wires or reinforcing steel that may form conductive or magnetic loops around ducts or duct groups.
5. Minimum Space between Ducts: 3 inches (75 mm) between ducts and exterior envelope wall, 2 inches (50 mm) between ducts for like services, and 4 inches (100 mm) between power and signal ducts.
6. Elbows: Use manufactured rigid steel conduit elbows for stub-ups at poles and equipment, at building entrances through floor, and at changes of direction in duct run.
 - a. Couple steel conduits to ducts with adapters designed for this purpose, and encase coupling with 3 inches (75 mm) of concrete.
 - b. Stub-Ups to Equipment: For equipment mounted on outdoor concrete bases, extend steel conduit horizontally a minimum of 60 inches (1500 mm) from edge of base. Install insulated grounding bushings on terminations at equipment.
7. Reinforcement: Reinforce concrete-encased duct banks where they cross disturbed earth and where indicated. Arrange reinforcing rods and ties without forming conductive or magnetic loops around ducts or duct groups.
8. Forms: Use walls of trench to form side walls of duct bank where soil is self-supporting and concrete envelope can be poured without soil inclusions; otherwise, use forms.
9. Concrete Cover: Install a minimum of 3 inches (75 mm) of concrete cover at top and bottom, and a minimum of 2 inches (50 mm) on each side of duct bank.
10. Pouring Concrete: Comply with requirements in "Concrete Placement" Article in Section 033000 "Cast-in-Place Concrete." Place concrete carefully during pours to prevent voids under and between conduits and at exterior surface of envelope. Do not allow a heavy mass of concrete to fall directly onto ducts. Allow concrete to flow to center of bank and rise up in middle, uniformly filling all open spaces. Do not use power-driven agitating equipment unless specifically designed for duct-bank application.

K. Direct-Buried Duct Banks:

1. Excavate trench bottom to provide firm and uniform support for duct bank. Comply with requirements in Section 312000 "Earth Moving" for preparation of trench bottoms for pipes less than 6 inches (150 mm) in nominal diameter.
2. Support ducts on duct separators coordinated with duct size, duct spacing, and outdoor temperature.
3. Space separators close enough to prevent sagging and deforming of ducts, with not less than four spacers per 20 feet (6 m) of duct. Secure separators to earth and to ducts to prevent displacement during backfill and yet permit linear duct movement due to expansion and contraction as temperature changes. Stagger spacers approximately 6 inches (150 mm) between tiers.
4. Depth: Install top of duct bank at least 36 inches (900 mm) below finished grade unless otherwise indicated.
5. Set elevation of bottom of duct bank below frost line.
6. Install ducts with a minimum of 3 inches (75 mm) between ducts for like services and 6 inches (150 mm) between power and signal ducts.

7. Install manufactured rigid steel conduit elbows for stub-ups at poles and equipment, at building entrances through floor, and at changes of direction in duct run.
 - a. Couple steel conduits to ducts with adapters designed for this purpose, and encase coupling with 3 inches (75 mm) of concrete.
 - b. For equipment mounted on outdoor concrete bases, extend steel conduit horizontally a minimum of 60 inches (1500 mm) from edge of equipment pad or foundation. Install insulated grounding bushings on terminations at equipment.
 8. After installing first tier of ducts, backfill and compact. Start at tie-in point and work toward end of duct run, leaving ducts at end of run free to move with expansion and contraction as temperature changes during this process. Repeat procedure after placing each tier. After placing last tier, hand place backfill to 4 inches (100 mm) over ducts and hand tamp. Firmly tamp backfill around ducts to provide maximum supporting strength. Use hand tamper only. After placing controlled backfill over final tier, make final duct connections at end of run and complete backfilling with normal compaction. Comply with requirements in Section 312000 "Earth Moving" for installation of backfill materials.
 - a. Place minimum 3 inches (75 mm) of sand as a bed for duct bank. Place sand to a minimum of 6 inches (150 mm) above top level of duct bank.
 - L. Warning Planks: Bury warning planks approximately 12 inches (300 mm) above direct-buried ducts and duct banks, placing them 24 inches (600 mm) o.c. Align planks along the width and along the centerline of duct bank. Provide an additional plank for each 12-inch (300-mm) increment of duct-bank width over a nominal 18 inches (450 mm). Space additional planks 12 inches (300 mm) apart, horizontally.
 - M. Warning Tape: Bury warning tape approximately 12 inches (300 mm) above all concrete-encased ducts and duct banks. Align tape parallel to and within 3 inches (75 mm) of centerline of duct bank. Provide an additional warning tape for each 12-inch (300-mm) increment of duct-bank width over a nominal 18 inches (450 mm). Space additional tapes 12 inches (300 mm) apart, horizontally.
- 3.5 INSTALLATION OF CONCRETE MANHOLES, HANDHOLES, AND BOXES
- A. Precast Concrete Handhole and Manhole Installation:
 1. Comply with ASTM C 891 unless otherwise indicated.
 2. Install units level and plumb and with orientation and depth coordinated with connecting ducts, to minimize bends and deflections required for proper entrances.
 3. Unless otherwise indicated, support units on a level bed of crushed stone or gravel, graded from 1-inch (25-mm) sieve to No. 4 (4.75-mm) sieve and compacted to same density as adjacent undisturbed earth.
 - B. Elevations:
 1. Manhole Roof: Install with rooftop at least 15 inches (380 mm) below finished grade.
 2. Manhole Frame: In paved areas and trafficways, set frames flush with finished grade. Set other manhole frames 1 inch (25 mm) above finished grade.

3. Install handholes with bottom below frost line.
 4. Handhole Covers: In paved areas and trafficways, set surface flush with finished grade. Set covers of other handholes 1 inch (25 mm) above finished grade.
 5. Where indicated, cast handhole cover frame integrally with handhole structure.
- C. Drainage: Install drains in bottom of manholes where indicated. Coordinate with drainage provisions indicated.
- D. Manhole Access: Circular opening in manhole roof; sized to match cover size.
1. Manholes with Fixed Ladders: Offset access opening from manhole centerlines to align with ladder.
 2. Install chimney, constructed of precast concrete collars and rings, to support cast-iron frame to connect cover with manhole roof opening. Provide moisture-tight masonry joints and waterproof grouting for frame to chimney.
- E. Dampproofing: Apply dampproofing to exterior surfaces of and handholes after concrete has cured at least three days. Dampproofing materials and installation are specified in Section 071113 "Bituminous Dampproofing." After ducts are connected and grouted, and before backfilling, dampproof joints and connections, and touch up abrasions and scars. Dampproof exterior of manhole chimneys after mortar has cured at least three days.
- F. Hardware: Install removable hardware, including pulling eyes, cable stanchions, and cable arms, and insulators, as required for installation and support of cables and conductors and as indicated.
- G. Field-Installed Bolting Anchors in Manholes and Concrete Handholes: Do not drill deeper than 3-7/8 inches (98 mm) for manholes and 2 inches (50 mm) for handholes, for anchor bolts installed in the field. Use a minimum of two anchors for each cable stanchion.

3.6 INSTALLATION OF HANDHOLES AND BOXES OTHER THAN PRECAST CONCRETE

- A. Install handholes and boxes level and plumb and with orientation and depth coordinated with connecting ducts, to minimize bends and deflections required for proper entrances. Use box extension if required to match depths of ducts, and seal joint between box and extension as recommended by manufacturer.
- B. Unless otherwise indicated, support units on a level bed of crushed stone or gravel, graded from 1/2-inch (12.5-mm) sieve to No. 4 (4.75-mm) sieve and compacted to same density as adjacent undisturbed earth.
- C. Elevation: In paved areas and trafficways, set cover flush with finished grade. Set covers of other handholes 1 inch (25 mm) above finished grade.
- D. Install handholes and boxes with bottom below frost line.
- E. Install removable hardware, including pulling eyes, cable stanchions, cable arms, and insulators, as required for installation and support of cables and conductors and as indicated. Select arm lengths to be long enough to provide spare space for future cables, but short enough to preserve adequate working clearances in enclosure.

- F. Field cut openings for ducts and conduits according to enclosure manufacturer's written instructions. Cut wall of enclosure with a tool designed for material to be cut. Size holes for terminating fittings to be used, and seal around penetrations after fittings are installed.

3.7 GROUNDING

- A. Ground underground ducts and utility structures according to Section 260526 "Grounding and Bonding for Electrical Systems."

3.8 FIELD QUALITY CONTROL

- A. Perform the following tests and inspections and prepare test reports:
 - 1. Demonstrate capability and compliance with requirements on completion of installation of underground ducts and utility structures.
 - 2. Pull solid aluminum or wood test mandrel through duct to prove joint integrity and adequate bend radii, and test for out-of-round duct. Provide a minimum ~~6-inch-~~ (150-mm-) long mandrel equal to 80 percent fill of duct. If obstructions are indicated, remove obstructions and retest.
 - 3. Test and handhole grounding to ensure electrical continuity of grounding and bonding connections. Measure and report ground resistance as specified in Section 260526 "Grounding and Bonding for Electrical Systems."
- B. Correct deficiencies and retest as specified above to demonstrate compliance.

3.9 CLEANING

- A. Pull leather-washer-type duct cleaner, with graduated washer sizes, through full length of ducts. Follow with rubber duct swab for final cleaning and to assist in spreading lubricant throughout ducts.
- B. Clean internal surfaces of manholes, including sump. Remove foreign material.

END OF SECTION 260543